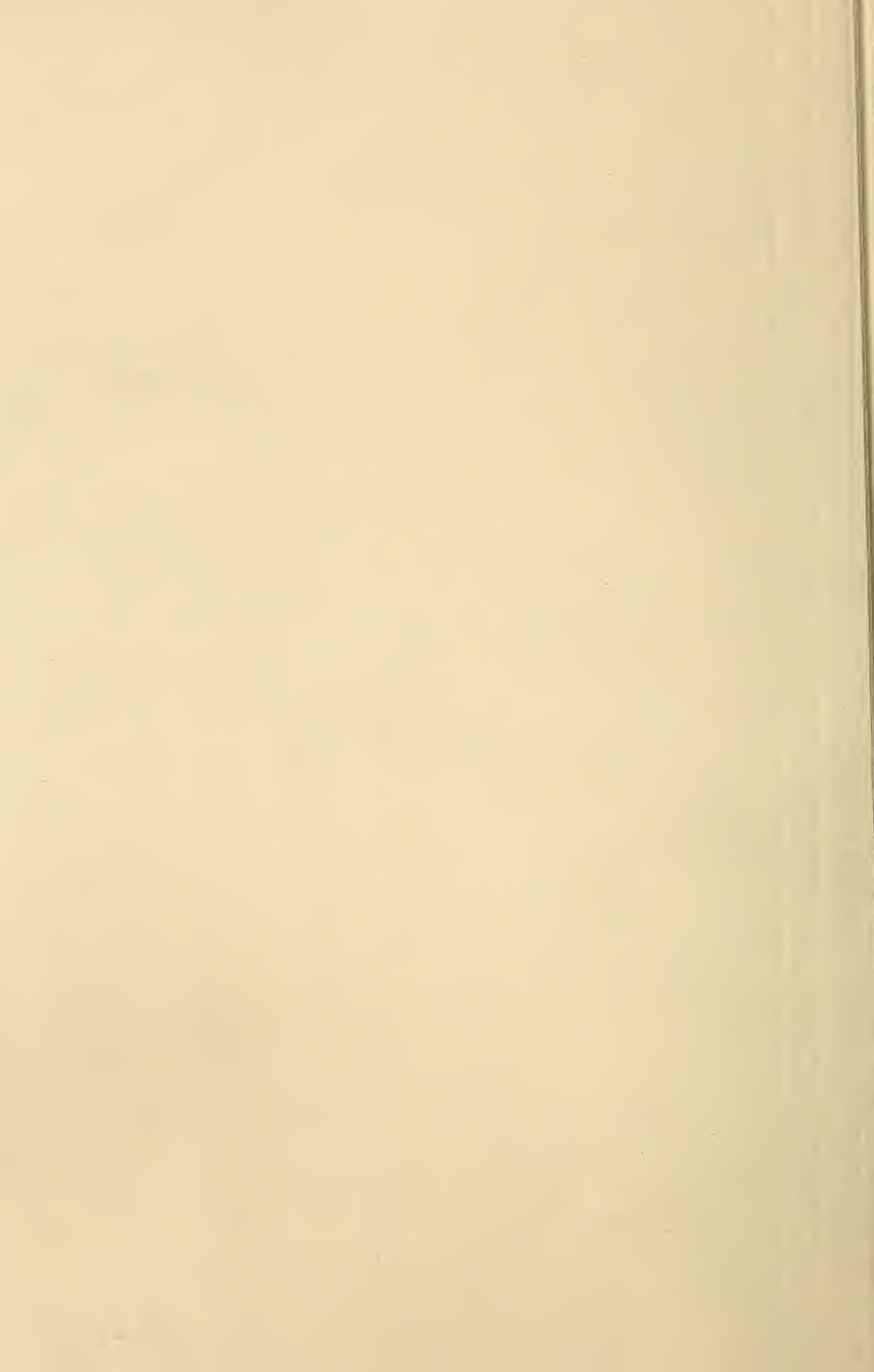


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GLEANINGS

A JOURNAL DEVOTED
TO BEES
AND HONEY
AND HOME
INTERESTS.

BEE CULTURE

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No. 4.



CHICAGO, Aug. 28, 29, 30. That's where and when the big convention will be.

IF YOU SHOULD happen to be in Paris Sept. 10, 11, or 12, don't forget to drop in at the World's Congress of bee-keepers that will be in session at that time.

HONEY extracted from combs in which generations of bees have been reared will granulate much sooner than that from new combs. So says *Elsass-Lothringischer Bienen-Zuechler*.

DR. DUBINI, when in Greece, visited Mt. Hymettus purposely to sample on the spot the famed Hymettus honey. He found it pretty poor stuff. The honey-plants are perhaps quite different from those of antiquity.—*Imkerschule*.

IT COSTS to exhibit at the Paris Exposition. *Die Bienenpflege* inquired what it would cost for books, and was told an exhibitor would pay \$2.00 for each volume after five volumes, but \$10.00 for the first five, and \$10.00 if he had only a single book.

THE NUMBER of big bee-keepers (Grossimker) in Switzerland, according to the *Luxemb. Bztg.*, is 1028. Of these, 535 have more than 25 colonies each; 333, more than 35; 105, more than 50; 24, more than 75; 18, more than 100; and 8, more than 150; the very biggest having 251 colonies.

SPEAKING of phonetic spelling, Editor Hutchinson says: "Asking readers to vote upon a subject, after the editor has expressed his opinion, is not a very sure way of learning the wishes of the majority." After seeing last GLEANINGS, he will probably re-tr—er—that is—say something further about it.

PROF. GASTON BONNIER put a cushion 2¾ inches thick, packed with oat chaff, over a colony, and measured the volume of air that passed up through the cushion. When the difference between the outside air and the air

in the hive was 16°, 353 quarts of air passed through in an hour; when 28°, 545 qts.; when 37°, 701 qts.; when 45°, 865 qts. The current was about twice as strong without the cushion.

THAT ARTICLE of J. E. Crane, p. 79, would add thousands upon thousands of dollars to the wealth of the country if it could be thoroughly understood by all fruit-growers. I knew in a rough way something of the facts he gives, but never so fully and clearly. In time the truth will percolate through the fruit ranks.

A FRENCH JOURNAL says Mr. Richardson in California in 1897 got 65,000 tons of honey from 1000 colonies! That's 130,000 pounds per colony. A story doesn't lose by travel. [The mistake above probably occurred from the word *tons* being made to follow the numerals. If, therefore, the 130,000 lbs. per colony be divided by 2000, we shall probably get very close to the actual figures.—ED.]

THERE SEEMS to be a prevailing opinion that in buckwheat regions people like buckwheat honey because they get used to it. There's much in that; but it will be probably found that everywhere there are buckwheat tastes, only it isn't known so well where buckwheat is little grown. Buckwheat honey is little known here, but I've known several with a strong preference for buckwheat honey.

YOU'VE SEEN a cell entirely filled with honey, but you never saw one filled with pollen, did you? A. Astor (*Revue Int.*) says it's because the bee must have room to stick its legs in the cell to kick off the pollen. Incidentally, I suppose it's a good thing to have space for a covering of honey to preserve the pollen. [This is an interesting observation; but incidentally I can not help noting that the doctor has learned to talk like the rest of us. You will remember that he insisted that a worker-bee should be designated by the feminine pronoun. But note how nicely he falls in line when he speaks about how the worker sticks its legs into the cell.—ED.]

THE *Leipziger Bienenzeitung* reports that some foundation made of pure wax ten years old was very brittle. A few drops of linseed oil were mixed with the melted wax, and then

the foundation was all right. [I am not surprised that foundation ten years old should be brittle—at least if it were of the old process, which it undoubtedly was; but if the foundation under consideration was melted up again, and then worked up again into foundation, it would be soft and pliable whether linseed oil were melted up with the wax or not. I am of the opinion that linseed oil had nothing to do with it. Any thing of an oily nature should be left out of the wax, otherwise the bee-keeper will have a mess on his hands some day when the weather is pretty warm.—ED.]

THE BUSY BEE well deserves its name. A. Astor fed a marked bee which worked from 6 A. M. till 5 P. M., making 110 trips a day, and kept it up for 12 days. But it aged terribly in that time.—*Revue Int.* On the other hand, Prof. Hodge's bees worked only $3\frac{1}{2}$ hours a day. [Now, if we had a national experiment station, or experiment station of any kind, in this country, making bee-keeping a specialty, here would be a nice field for investigation; and there would be something practical to be learned from it too. For instance, what strain of bees make the greatest number of trips in a day? and does the amount of honey depend on the number of trips? Perhaps some bees have larger honey-sacs as well as longer tongues.—ED.]

ALEX. ASTOR reports in *Revue Internationale* that a bee fed very thick honey took more than three times as long for the round trip as when fed equal parts honey and water. Given its choice, it took the thin every time. He says robbers prefer the thin—gain time in the long run. [I always supposed the reason why bees preferred thin nectar or thin honey or thin syrup was because they could then ripen or digest it more than where it was more nearly of the consistency of ripened honey. Indeed, we do know that syrup almost as thick as honey will be syrup still when stored in the comb; but if, on the other hand, it stands in the proportion of 50 per cent water, the bees will convert it into what may be called a kind of honey, giving it that honey taste that leaves a smarting or burning feeling in the throat.—ED.]

SO MUCH is said in foreign journals about horseradish for stings, that those seeking a remedy might try it. It is even said that, by mashing the leaves and rubbing the juice on the hands, bees will not sting them. [The only effect that horseradish would have would be its strong odor, which odor might have a tendency to drive the bees away. It is well known that bees, when about to sting, very often hesitate, seeming to select a good tender spot. If the vulnerable parts were smeared with some strong pungent liquid, it might have a tendency to prevent a certain class of would-be stingers from accomplishing their purpose. But nothing in the world would stop the onslaught of bees that are suddenly stirred up by a sudden snap or jar. It is *then* that they make a strike like a bullet, and hit the mark, odor or no odor.—ED.]

"THE NEXT THING we shall want to know is how to make extracted honey candy quick-

ly," p. 91. Yes, that is a point that has been reached and discussed in Germany. To hasten granulation, stir occasionally. [At the Colorado convention it was mentioned that stirring did have quite an effect in hastening the candying of honey. If honey could be extracted from the combs without so much violent agitation, it would probably remain in the liquid form as long as that in the combs; for it is well known that honey in the comb will resist granulation much longer than that which has been separated by the extractor or by any other means known. So I think we may set it down as a fact that agitation is one of the prime causes of granulation; and the more we agitate, the sooner will it granulate. Another favoring condition is a freezing temperature for a given length of time.—ED.]

AT THE SUPER-TABLE I read about W. L. Coggs, p. 94, and ended by saying, "And a nice, pleasant man he is." At once came two voices, "Why. I thought he was a coarse, rough old fellow." I laughed. They had never seen W. L.'s genial face, and knew only that "kicking" story. [Human nature is inclined to remember the peculiar or striking features of a man or his methods; and the kick-off-super act of Coggs seems to be the handle by which some of our friends hold him in mind. If so, I am responsible for making this feature prominent; and if I do not look out I am afraid my friend might practice his professional art on me the first time I go into his locality. Yes, indeed, Coggs is a nice fellow; and with all his other good qualities he is exceptionally modest; and one who has had the experience he has, and runs as many colonies as he does so successfully, might be pardoned if he should attempt to teach beekeepers at conventions some things they did not know before. But that is not his style. He has to be *drawn out*.—ED.]

THE EDITOR mentions, p. 90, a point too little noticed—10° above zero with a high wind is worse than 20° below without wind. That explains why a winter at Marengo is worse than in many places away north. Here the wind blows hard, not merely for a little while, but makes a steady business of it the whole enduring day. Some of you people don't know what a genuine windy day is. [Yes, indeed, there ought to be a great deal of emphasis placed on the fact that a high wind with a moderate amount of cold is much more destructive than a very low temperature below zero without wind. If this is true, it behooves us to put up windbreaks in the shape of high board fences or evergreen-trees. It will be remembered that the winter losses outdoors at Medina have been very low—scarcely ever exceeding 5 per cent, and usually about 2 per cent. Our apiary is shielded on the north and west sides by a solid phalanx of evergreen-trees from 20 to 30 feet high; and on the east and south by brick buildings and lumber-piles. The result is, that on the days of our highest winds there is comparative quiet in the apiary. True it is, there is a great roar of the wind from without, but there are only slight air currents within. A windbreak of evergreens does not cost much, and is perpetual after it is

once put down. One consisting of a barn and out-buildings, with an occasional stretch of a board fence on the north and west sides, would be equally effective; and I am satisfied that the slight expense of maintaining the fence or trees would be made up in a few years' time, ten times over, in the saving of many colonies of bees, and preventing others from getting so weak that they are practically useless for honey production.—ED.]

"COLORADO isn't a good country for nervous troubles," p. 90. Nor for heart troubles—too high altitude. A little nephew born in Colorado had heart disease so bad that physicians pronounced his lease of life very short, and that he must never again be allowed active exertion. Came to Illinois—got strong. Went back to Colorado—disease returned worse than ever, and he died. [Yes, Colorado is a rather hard place for those who have heart troubles. While I believe I have normal health, and that my heart is normal, beating at 76 in Ohio, it ran up to 120 at an elevation of 9500 feet—nearly two miles—and in Denver the pulsations were about 100. Denver itself lacks about 15 feet of being 5280 feet (one mile) above sea-level. Central City, a mining town up in the heart of the Rockies, two miles above the level of the sea, that I visited, is a place I should not care to reside in very long. I experienced a shortness of breath that seemed almost suffocation; and how those people live there year after year, and how the horses and mules in that country can pull heavy loads over the mountains, without getting clear out of breath, is beyond my comprehension. But I suppose they get used to it, and think nothing of it.—ED.]



Winter slowly wears away—
Skies are foggy, landscape gray;
Bees are flying round our head—
Tired, perhaps, of winter's bed.

"Modern Bee-keeping" is the title of a little book of 16 pages, by Gilbert Wintle, of Como, Quebec. It does not claim to be a hand-book on bee-keeping, but is simply an attempt to explain to outsiders something about what is certainly a most interesting industry. It is well written, and should have a wide circulation. It is sold at the nominal price of 10 cts., and can be had by addressing the Family Herald Pub. Co., Montreal, Canada.

We have just received from E. T. Abbott, of St. Joseph, Mo., a copy of the *Kansas Farmer* containing an address delivered by him before the Kansas State Horticultural Society, Topeka, Dec. 27, on the subject of bee-keeping in relation to fruit-raising. Mr. Abbott seems to have gone from A to Z in this matter, and, considering his audience, this essay can

not fail to do great good. While there is much in it with which we are all familiar, there is much additional truth brought out, all going to show one thing—the great part bees do play in fertilizing fruit-blossoms, and the still greater part they may be caused to take in that work. Doubtless Mr. Abbott will furnish a copy to all applying; and to enable him to do so the address should be printed in pamphlet form.

Now for that recipe for making bird-lime. A friend asks why it is called "lime." It is probably a misspelling of the German word *leim*, meaning *glue*—a good deal on the principle that a German says *clay* when he means *clover*. Here is the recipe:

There may be difficulty for some to make it, as it is made from the bark of the holly-tree, and that grows only in the South. First, peel the bark from the tree, and boil it soft; then strip the outside skin off, and throw it away. Bury it four days, after which beat it into a pulp. Wash clean, when it is fit for use. As to its use, smear a twig with the lime, and fasten it so the twig will drop. When the bird alights, the feet stick to the twig, and the wings get stuck so the bird can not get away, and is caught fast. The lime will keep for a year.

CANADIAN BEE JOURNAL.

Men have been rejected in considerable numbers who sought enrollment in the U. S. army because they have what is called a "tobacco heart." There are many evil fruits which flow out of "small vices," unwisely adopted and needlessly continued.

That reminds me that there is now on my desk a copy of *The Australian*, giving two large half-tones of what is called Victorian Club Smoke Night. Describing it the editor says:

The big room of the Vienna Cafe was far too small for the concert and smoke night of the old Church of England Grammar School boys and their friends on Thursday. A move was suggested to the Athanæum; but as pipes were going, and the "rosy" was already circulating, chairs were squeezed up, and the old boys sat literally shoulder to shoulder.

The whole thing is a swell drunk and smoke; and when we consider that it comes from one of the leading *religious* fountains of instruction of the English youth, it makes one wonder whether the church or the Boers are doing the most to rob England of her strength. The whole scene is below the plane of healthy savagery. Worse still, Queen Victoria detests tobacco, and will not have it around her. It is refreshing to think that some bee-keepers in Australia are not of that ilk.

BRITISH BEE JOURNAL.

With the death of Mr. Dickel's journal, his theory seems to have gone with it. The tenacity with which Mr. D. clung to his theory in the face of all opposition was worthy of a better cause. It stands opposed to parthenogenesis (virgin genesis), which may be defined as follows, according to the *British Bee Journal*:

The queen, after she has once been mated, can lay at will two kinds of eggs—fertilized and unfertilized, the former of which produces females; the latter, males.

The Dickel theory is this:

1. The fertile queen-bee lays only fertile eggs, the fate of which depends solely upon the worker-bee, which alone has the power of determining the sex of the resultant insect. 2. This power is exercised

through the medium of two pairs of glands, one pair of which secretes the needful element for the production of drones, the other that necessary to produce queens and workers only. The secretion referred to is supplied during the hermaphrodite stage of the larva, and continued until the commencement of the nymph stage, the ultimate determination of sex being brought about by the secretion of both these glandular forms. 3. In the case of unfertile eggs, that is, eggs laid by unmated queens or by "fertile" workers, only drones can result.

These drones, however, are *abnormal*, and by no means the same as those produced from fertile eggs. The normal drone possesses, of course, perfect generative organs, but in the "abnormal" insect these are wanting. Up to the present no such distinction has been made.

The writer adds :

All Dickel's experiments, as well as those of his supporters, are based upon abnormal circumstances, and therefore it requires only common sense to see that the queen, finding only drone-comb in her hive, laid worker-eggs as well as drone-eggs, and both were produced accordingly.

This will probably conclude the matter. The articles in question were written by Mr. R. H. Harris, F. Z. S., and his scientific examination of this strange theory has left no room for its further discussion.



AMERICAN BEE JOURNAL.

Mr. J. M. Donaldson relates his experience in trying to sell clover honey after buckwheat had preceded him on the same route. It contains some valuable hints.

Last year a man came through this district selling buckwheat honey. It was a nice grade of comb honey, put up in cartons; he was selling it very cheap, and disposed of quite a large quantity. Some of my customers did not forget to call my attention to the difference in his price and mine. One of them told me he would ruin my trade.

I did not pay much attention to their remarks, as my crop was all sold, and I could not understand how he could hurt my trade, as he was selling buckwheat honey, and mine is from clover. But I soon learned my mistake, when I began selling my honey the past fall. One of the first houses I called at, I showed the lady a jar of extracted honey, telling her the price of the same. She said, "Our folks don't like strained honey. We always get ours in the comb."

Then I showed her a nice, well-filled section. After examining it she said, "Well, that looks nice, and it is well filled, but we bought some last year that looked nice, and we could not eat it."

I knew it would be useless for me to have her try the extracted honey, then explain to her that it was the same quality, so I passed on to the next house. One of my regular customers lived there, so I made a sale.

But I had gone down the street only a short distance, when I received almost the same story as I did at the first house. This set me thinking. How could I overcome these arguments? I thought if I could let them sample the comb honey, the same as I do with extracted, all would be well.

I was only three blocks away from home, so I went back and got some of my unfinished sections. I cut the honey out of one of them, placing it on a plate. I called at the same houses, and asked the ladies to sample my honey. The result was ready sales. I have used this plan since then, and I find it a great help, even when calling on my regular customers. When you give them a taste of honey (good honey) it seems to create a desire for more.

FERTILITY OF QUEENS.

When to Weed out Poor Queens; Queens from the Swarming Impulse.

BY F. A. SNELL.

It is a well-known fact to most bee-keepers that queens vary in prolificness, some being able to lay as many as 3000 eggs in 24 hours

in the height of the breeding season, while other queens do not produce or deposit half that number under the same conditions, the queens being of about the same age. It is expected that queens failing from old age will not do so well. We may have two colonies side by side in the same apiary, equally strong in the spring. Later on we may see readily that one is outdoing the other, and becoming stronger. If the amount of worker comb is the same in one as in the other, and the supply of food about equal, no reason can be seen for this difference, providing the heat is retained by equal ventilation at the start. The only reason to be given for the better progress of one colony over the other must be in the two queens. One deposits eggs freely, and the workers hustle to care for the eggs and to develop this brood; and in this hive every energy is bent toward rapid progress. In the other hive, fewer eggs and maturing brood are found in a less number of combs; and if this colony becomes strong, the season may be advanced into June, or the surplus storing season, before work can be commenced in the surplus apartment. The better colony will, by June 1, be a powerful one; and when the flow for surplus begins, and the supers are put on, the bees are ready to rush into the supers and begin work there at once; and when the first super is half or two thirds full, a second one can be placed under the first provided with starters, and work will be commenced in this, and even a third super may be put on, and all be filled in a good flow from white and alsike clover bloom.

The colony with the poorer queen may or may not fill one complete super in the same time. This comparison is not drawn from fancy, but from observation and experience.

Now, the question arises as to cause and remedy in the case of the inferior colony. The cause is often in the rearing of queens when the conditions are such that good queens can not be reared. Good queens can not be rerred in a time of scarcity of honey and pollen in the fields. No wise apiarist will practice doing so. If the queen in a colony be lost any time during the working season, the bees of that colony will rear one in her place, be she good, fair, or poor. They will do the best they can under the circumstances. If the queen be inferior she should be removed and a good one given.

No better time can be found to rear queens than at swarming time. The apiarist should form nuclei, and save the queen-cells from the choice colonies. When the brood hatches, the purity, if Italians are bred, can be known; and if pure, the poor queens in the apiary can be superseded by these choice young queens. In our apiary we aim to rear enough such queens to replace all that do not please us each season, and a few extra ones. Nothing in the apiary pays any better than the labor spent in weeding out the poor queens and having good ones in all the hives. This is the only way that the standard of value can be raised in the apiary, and the maximum amount of honey secured.

Milledgeville, Ill.

New York Bee Disease, or Black Brood.

BY WM. R. HOWARD, A.B., M.D.

Fellow of the Texas Academy of Science, Professor
Histology, Pathology, and Bacteriology, Medical
Department, Fort Worth University, Fort
Worth, Texas.

Author of "*Foul Brood; its Natural History, etc.,*,"
"*Pickled Brood,*" and *minor Papers on
Diseases of Bees.*

INTRODUCTORY.

In my investigations of this disease I have carefully examined each specimen separately, and noted the details in my laboratory note-book, from which extracts have been made. I have received specimens from Messrs. Geo. W. York, editor of *American Bee Journal*, Chicago, Ill.; E. R. Root, editor of *Gleanings in Bee Culture*, Medina, Ohio; N. D. West, New York State Bee Inspector, Middleburgh, N. Y.; and P. H. Elwood, Starkville, N. Y. All of these men have furnished, not only material, but have been active in getting data for the investigation. Mr. N. D. West has kindly written up the history of the disease as it appears in the apiaries which he has visited. Mr. P. H. Elwood has contributed his experience, as well as answered questions relative to certain points of interest. In making a report of the work and of the character of the disease, I have endeavored to write a complete history of its nature so far as is known, so that those who have not seen it may appreciate the work, and be able, possibly, to recognize it. I have drawn largely upon what these gentlemen have furnished, as well as from notes taken from my experience with the disease transferred by infected food to healthy bees in my own laboratory.

I have made more than one thousand microscopical examinations, and have given the results of those of the most practical importance, followed by a general summing-up of the facts, and the conclusions based upon them.

A differential diagnosis has been made between this disease and those of foul brood and pickled brood, considering most of the diagnostic points worthy of interest.

On account of the character of the dead brood; its beginning with a dark spot on the larva, which increases in size, becomes darker, and finally black, for convenience and brevity the name *black brood* has been suggested, and this name is used in the text.

In conclusion are given a few remarks upon the recurrence and treatment of this disease from a practical standpoint.

The drawings have been taken from my laboratory note-book, and were made from nature as the work was going on.

HISTORY.

From the best that can be learned of the first appearance of this disease, Mr. N. D. West, New York State Bee Inspector, writes:

"A Mr. Overbaugh, of Sloanville, N. Y., three or four years ago, bought ten nuclei from some man in Tennessee whose name and address have been forgotten. Of these nuclei, only seven were sent, which were found the same fall to be foul. They were allowed to stand, and robbers from neighboring colonies spread the infection. As nearly as I can learn, this infection has extended north twenty miles; west and south twenty-five miles.

"About the time apple-blossoms come in, this disease breaks out all at once and spreads with amazing rapidity. The young larva will have a yellowish speck on its body, about the size of a pinhead, while the older brood will stand out lengthwise in the cell, sharp at the ends; white, but not capped over; this brood dies, and is either removed by the bees, or,



BACTERIOLOGIST DR. WM. R. HOWARD.

later, flattens down in the cell and becomes of a cream color, and, later still, a coffee-colored mass. Later in the season some brood that died in the cells, which had been capped over, becomes a rotten mass—a coffee-colored matter about the consistency of heavy honey. A toothpick dipped into this, and drawn out, causes this matter to stretch from half an inch to an inch, but does not break and fly back quickly as in foul brood. The smell is not very bad in any of the many cases I have examined this season. In some it has a sour smell, while in some of the sealed rotten coffee-colored brood it has a kind of rotten smell, but not like that of the old-time foul brood. There seems to be a level where bees either go down or get better, so that, later in the season, no diseased brood can be found. Where the

colonies are light with honey the disease seems to show more. This year I noticed a continual reappearance of bad brood from fruit-bloom to basswood-bloom, which yielded very little honey—only three or four days; and during this flow the bees pretty well cleared their combs of the bad brood. They were greatly encouraged, and reared some good brood with this new honey as a stimulus; but as this flow was soon over, there was an increase of bad brood, with no honey in the field. When buckwheat came into bloom, the bees again cleared their combs, so that in strong colonies it was difficult to find much of this bad brood. The combs were soon filled with honey and some good brood, the diseased brood having been removed either by the bees, or dried up in the cells, and covered with honey.

"I find that, if swarms that are affected are made strong with bees of all ages, they will largely do their own house-cleaning. I believe, too, that a supply of food should be given at a time of scarcity of honey in the field. I believe, also, that a season with a good continuous honey-flow will in part wipe out the disease.

"While many apiaries have been wholly ruined, yet those who have fought it have saved more or less bees. I have caused the bee-keepers to drive the bees out into new hives—McEvoy's method. Then in a great many swarms it starts up again, but they generally rear some good brood first. Where bees have passed a certain limit they should be placed on frames of comb foundation—McEvoy's method—and given bees enough by uniting to make them strong; and if no honey is in the field they should be fed.

"Mr. Julius Hoffman, after treating his bees in this way, noticed that the disease recurred. He sprayed them with a mixture of salicylic acid and syrup, in the proportion of one-fourth ounce of the acid in alcohol sufficient to dissolve it, four pounds of sugar, and one gallon of water. This was used twice, and when there was a dearth of honey in the field he fed this medicated syrup with ten pounds of sugar to the gallon. He boiled his hives in

strong lye, and pronounced his bees free from disease. They were in the best condition of any in that neighborhood. He also used carbolic acid, making a weak solution, and saturated burlap, which he cut into pieces the size of the frames, and placed one on either side of the brood-nest between the division-board and the hive-body.

"Sometimes I find it in six or eight colonies, side by side, and sometimes it is confined to one end of the apiary. I account for this by bees entering the wrong hive."

Mr. P. H. Elwood, in a letter of Nov. 13, 1899, mentions the same fact. He says:

"It appears to be worse in spots in an apiary. We thought that this might be accounted for by bees getting into the wrong hives. It also seems to spread through the air." Mr. Elwood continues:

"It appeared here the spring before your article in the *American Bee Journal* [Sept. 10, 1896], diagnosing between foul brood and pickled brood. Until your article appeared I did not know what to call it, as it did not develop the characteristic odor, ropiness, etc., of foul brood. I called it, thereafter, pickled brood; and as it appeared in a more deadly form I called it malignant pickled brood. The specimen sent you is from a hive in which was as bad a case throughout the season as I have seen. It developed a sour penetrating smell that I could detect outside of the hive. As there is no young brood in the specimen it may require a more careful examination to discover it in its dormant form. I hardly believe that I am mistaken as to the disease having both a mild and a malignant form. What I call the malignant form may be altogether another disease. This is the opinion of some who hold that pickled brood is a forerunner of the other, but I think not.

"It seems to me that the adult bees are affected with this disease. In no other way can I explain the rapid weakening of the colony or the inability of the bees to gather honey."

In a subsequent letter (Dec. 12), in answer to some questions, he writes:

"In response to your questions I have been expecting to get some information from those

EXPLANATION OF PLATE; MAGNIFIED 600 DIAMETERS—REDUCED.

Fig. 1.—*Bacillus mili*. *a*, spore formation, showing morphological changes, in agar-agar plate culture; *b*, peculiar arrangement often noticed in cultures; *c*, isolated bacilli, floating in the liquids of the bee or in cultures; *d*, Zoöglea, showing the most common arrangement of the spores at the center, and the separation of the bacilli from the mass.

Fig. 2.—*Bacillus thoracis*, *a* showing rods arranged end to end as occurs in cultures; *b*, peculiar arrangement seen in agar-agar drop cultures, showing spores by fission; *c*, Zoöglea, showing common arrangement of the mass.

Fig. 3.—*Mucor*, *a* showing the spore-bearing heads; *b* showing these heads discharging the spores. Common on decaying matter.

Fig. 4.—*Aspergillus pollinis*, the fungus causing "Pickled Brood."

Fig. 5, *Fungi*.—*a*, *Hendersonia polycystis*.

Fungus found on dead twigs, grasses, etc.; very common; *b*, *Dactylium rosaceum*, appears as pinkish roseate spots on decaying vegetation; very common; *c*, *Massaria*, var. *d* and *e*, fungi not common—not placed; unimportant.

Figs. 6 and 7, spore-bearing organs of fungi.

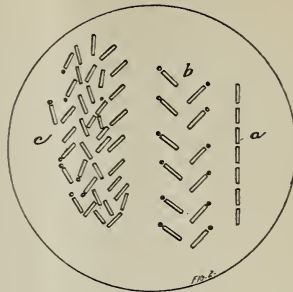
Fig. 6, *a*, transparent spore-receptacle intact; *b*, same, showing membrane ruptured and spores escaping.

Fig. 7.—Contains similar spores in size and shape, which escape through the membranous pouches triangularly arranged at the dentate periphery. Found in pollen. No culture made.

Fig. 8.—*Penicillium glaucum*, common fungus, found on moldy bread and elsewhere; very common.



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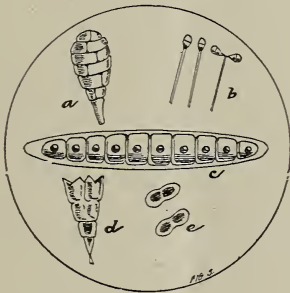
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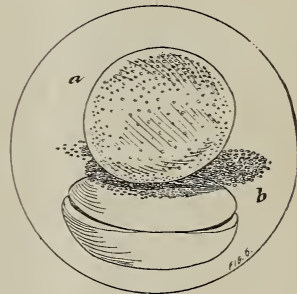
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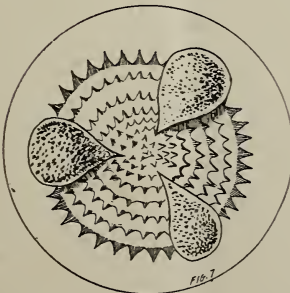
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more experienced, but have failed. To your question, 'Do not queens cease, or almost cease, to lay in badly infected colonies?' I can say that they do. I have often noticed that, when the strength first runs down, as it often does, rapidly, the young brood is disproportionately large; later there is little young brood. To your question, 'Do not hundreds of nurse-bees die before they are of field age (14 days)?' I shall have to reply that I do not know. It is plain to me, however, that hundreds of mature bees die away from the hive; but whether young or old or both I can not tell. As often the first indication of the disease is the observed check in the honey-gathering, I have thought that, probably, bees of all ages were affected. I have removed hundreds of queens from populous colonies during the swarming season, but there is *never* that rapid loss of strength noticed in this disease, thus proving to me that this depopulation must come from the loss of flying bees and not entirely from diseased brood. When swarms have been shaken on foundation, and have carried the disease with them, I have noticed that many bees, nearly mature, died in the cells, and but little, comparatively, of the younger (not yet sealed) brood was affected. From this I have drawn the conclusion, that perhaps the mature bees were the ones first affected, and that by them the disease was communicated to the brood; and when the contagion was strong, the brood died early; and when weak it lived to be older, even to maturity. This conclusion is partly speculative, and I have written it thinking it might be suggestive to you."

Mr. N. D. West, in a letter of Dec. 8, 1899, gives the experience of a large honey-producer which will be of interest here:

"He shook the bees off the combs of 150 colonies, early in the season, when the disease was at its worst stage. He extracted the honey, and made the combs into wax. This fall, after the honey-flow was over, he had a great many partly filled sections he wished to have finished. He placed these on twelve hives, and fed the extracted honey from under the hive; and when the sections were completed the bees had a fine lot of healthy brood. This was so late in the season that no other brood was in the yard. He intended to destroy the twelve colonies as soon as his sections were finished; but I asked him to winter them and watch the results next spring. I think he said he would do so. However, in his apiary I do not think the disease had advanced far enough to show the coffee color very much."

LABORATORY INVESTIGATIONS.

After thoroughly examining the specimens sent by Messrs. York and Root I received from Mr. N. D. West, New York State Bee Inspector, two specimens—No. 1 and No. 2. These had the same general appearance as the first specimens, and proved the same microscopically. None of these were foul brood or pickled brood.

No. 1.—[WEST.] Marked "*bad brood.*" New bright comb, containing eggs and brood from larvæ just hatched, to full-grown bees emerging from the cells. Some appeared to have

died from disease, and others from want of food. The eggs were free from all signs of disease—no germs. Some were laid in cells containing remnants of the old dried mass, which, in some instances, extended the entire depth and on all sides of the cell, and was of a light brown color, sometimes dark brown, less frequently jet black. In some instances the mass had been removed by the bees or the liquid substances evaporated, leaving only the cocoons, the skin of the pupa or larva, as the case might be. Young larvæ in these cells were affected, and even larvæ only a few days old would show the characteristic dark spot on some part of the body, being the first sign of the disease to the unaided eye. This showed more plainly on older brood that had been fed the rich nitrogenous chyle mixed with pollen. Honey was also found in these foul cells. A few small particles of pollen were found, but these were free from infection. Cultures were made, and *Bacillus milii** and *Bacillus thoracis*† were found in all cultures. From some specimens cultures were made showing almost pure cultures of *Bacillus milii*, the *Bacillus thoracis* being entirely absent. Specimens sent by Messrs. York and Root showed the same forms. In some of the culture-tubes a species of fungus (*Mucor*, Fig. 3) grew luxuriantly—unimportant, as it is found on decaying matter, both animal and vegetal, and not parasitic on a living host.

No. 2.—[WEST.] Marked "*different vicinity.*" Old black comb, brood of all ages, no eggs, no honey, no pollen, few cells capped, with mature bees dead and rotten; some of the larvæ showed signs of disease; cultures made from these developed altogether *Bacillus milii*; no *Bacillus thoracis* found.

Oct. 22, 1899, two more specimens received from Mr. West, No. 3 and No. 4.

No. 3.—[WEST.] Marked "*Boomhower.*" Comparatively new comb; wired; one cell contained a small amount of fresh pollen—not infected; a few cells filled with honey, some in foul cells, a few cells containing black rotten masses of a decidedly watery consistency, which, under the microscope, appeared oily or milk-like; also a few pupæ which have dried by evaporation of the liquid substances, leaving them without discoloration or much change in shape; not settling down to the lower side of the cell as is common; few of these showed signs of disease. There were also found in open cells, dark brown heavy masses much like those found in foul brood, yet not so dark, so adherent to the combs, nor so hard and glue-like, but drier and more granular. The heavy dark masses contained *Bacillus milii*, and many species of fungi—[Fig. 5], latter not important.

No. 4.—[WEST.] Marked "*M. Rickard.*" Comb nearly new; no eggs, no larvæ; over half the area scattering sealed brood. Many pupæ showed no signs of disease, and seemed to have died from natural causes—absence from the hive, environments, etc. In the

* *Bacillus milii*, n. s. So named from its resemblance to millet seed. [Fig. 1.]

† *Bacillus thoracis*, n. s. Found in the thorax, and in the air-passages, spiracles, etc. [Fig. 2.]

thorax of the well-advanced pupæ, dark and rotten *Bacillus thovacis* was found; in every examination of the abdominal contents, *Bacillus milii* was found, indicating a mixed infection. One cell contained some old pollen in which was found the fungus [*Aspergillus pollinis*, Fig. 4] of pickled brood. This was also found in many of the dark rotten masses. The combs were riddled by the wax-moth larvæ (*G. cereana*).

No. 5.—[WEST.] Marked "diseased brood." Received Nov. 4, 1899. Comb nearly new; few eggs, no larvæ, dark dried masses not sealed, and sealed brood. Many pupæ dried out without discoloration or loss of shape. Of more than one hundred bees examined from this specimen, only one showed signs of death from disease, and this showed *Bacillus milii*. In one old dark dried mass, not sealed, was found the same germ. One cell contained pollen, of which several mounts were made, discovering various parasitic fungi [Fig. 5, b, b; Figs. 6 and 7], the most important of which was *A. pollinis* [Fig. 4], the fungus of pickled brood.

The combs from P. H. Elwood were old and black; a few cells of sealed brood, and many cells in which were the old dried black masses. Careful investigation revealed nothing new; the two germs already isolated were present in most instances. Cultures revealed a multitude of putrefactive germs.

EXPERIMENTAL INVESTIGATIONS.

Nov. 7, 1899, I secured, through the kindness of Mr. L. Cowell, an enterprising beekeeper in the suburbs of this city, two nuclei for experimental purposes. Each had bees enough to cover three or four Langstroth frames, and were designated as Nos. 1 and 2.

No. 1.—Had one frame with sealed brood on both sides, and one frame with sealed brood on one side, plenty of bees to cover the brood; no larvæ; few eggs; bees hybrids, queen dark, one year old; plenty of normal pollen not infected; some honey; also some sugar syrup already in stores; clean combs and in good condition, generally, for so few bees.

No. 2.—About the same as No. 1, except that there were more bees, brood of all ages, less stores, plenty of natural pollen not infected; queen dark, two years old; no honey coming in, on account of early frosts and subsequent rains.

After making the above notes I placed 100 cc (nearly half a pint) of infected syrup containing *Bacillus milii* from cultures twenty-four days old, in each hive. Nov. 10 No. 1 had stored all the infected syrup in the combs; no sealed brood, no larvæ, a few eggs, queen apparently active.

No. 2 had stored all infected syrup, brood of all ages, no signs of disease; fed infected syrup as before to each. Weather for the past three days fine; bees bringing in fresh pollen and some honey.

11th, weather bright and warm—mean temperature 80° F.; 12th, removed feeders from each hive.

No. 1.—Larvæ just hatched, queen active, few eggs.

No. 2.—Much the same as before, except

that the area of brood had increased; weather fine; 3 P. M., temperature 82° F.; no evidence of disease; bees bringing in pollen and some honey; did not place more infected syrup.

Nov. 26.—Examined bees again. No. 1 contained no brood of any kind, no eggs, queen apparently all right. On account of pressure of other business the bees were not examined from the 12th to the 26th, and it is not known what became of the brood present at the last examination. As the queen is only one year old with plenty of normal food, including a large quantity of infected syrup, one might suspect that the infection had something to do with its disappearance, as the weather has been fine.

No. 2.—No eggs, larvæ six or seven days old, indicating that the queen had ceased to lay for the past ten days; considerable sealed brood. At the outer edge of the circle were found several scattering cells not yet hatched or uncapped. From these were removed three nearly matured dead bees. Other pupæ were nearly white with the dark spot on the abdomen; some were dark while others were entirely black. In this, as in some of the New York specimens, there was some destruction or disfigurement of the cappings, which appeared to be from without rather than from within, as if it had been done by the impatient nurse-bees. These were in every respect like the originally examined specimens from New York, and the examination of nearly one hundred slides from these nearly matured bees, *Bacillus milii* was found in nearly every preparation. In no case did I find, in these combs, larvæ of any age dead, or apparently suffering from the infection; yet on examining several larvæ I found the significant *Bacillus milii* from which cultures were made. Now, here it seemed I had "struck a knot," so to speak. Why did not the infected larvæ die as readily as the infected pupæ died? This was a problem for solution. A few remarks upon the life characters of bacteria in general will make this matter better understood, and satisfactorily answer our question.

Some bacteria grow well in a neutral and few grow in an acid medium. While these grow feebly in a neutral and not at all in an acid medium, they are best suited to an alkaline medium. They are anaerobic (live best without air). The liquids of the young larvæ for the first six or seven days give an acid reaction; therefore, although these germs are sparsely present in the body, they are in an antiseptic medium, and do not grow at once. When the larvæ are older, and pollen and a richer chyle-like food is given, the liquids become neutral—finally alkaline naturally—thus giving the proper medium for a rapid growth. As we have observed in artificial cultures, the alkaline medium gradually, in a few days, becomes acid with a consequent cessation of growth, also that the watery masses of dead brood gave an acid reaction, we may infer that the acid condition of the young larva has much to do in protecting it from active infection. This conclusion is supported by facts sufficient to warrant its correctness.

Dec. 14.—Bees again examined.

No. 1.—No eggs, no brood; plenty of pollen, honey, and infected syrup; several perfect bees examined; nothing found to indicate disease or infection. Their stomachs contained pollen from flowers just out of bloom (composite).

No. 2.—No eggs, no larvæ, about thirty cells of sealed brood containing dead, black, young, nearly matured bees; flowers gone; rainy and cold weather—temperature 40° F.; a pollen-like, liquid, acid excrement voided as the bees leave the hive. No examination was made of these droppings—evidently a ferment in the alimentary canal. Over fifty slides were examined from these dead bees; all contained *Bacillus milii*.

Dec. 20, bees again examined. They look black and sleek, ragged wings, and much discouraged; no brood in either hive; plenty of stores; queens present; estimated less than half the original number of bees.

CONCLUSIONS.

Here conclude my investigations, which have been carefully conducted; although under disadvantages as to season, etc., they have in a great measure been satisfactory. Many points of vital interest have been made clear, while others of equal importance are necessarily obscure. It is clearly not foul brood. It is clearly not pickled brood. It is clearly something new. It is apparently a disease of the pupa stage. The infection is clearly not in the pollen—not due to a fungus but due to bacteria.

All diseases, in animal and vegetal life, are due to the results of parasitic invasion—some by their mechanical presence, some by the ferments produced in the body, and in plants by changes in or taking from them their life juices, causing starvation and immature growth.

In any given case of rotten brood, dead from freezing, starvation, or other causes, being allowed to remain in the cells, much of the poison generated, as well as the germs themselves, or their spores, remain adherent to the sides of the cell. These are like the seeds which "fell on stony ground," and will not grow until the proper soil, such as is furnished by the rich nitrogenous substances supplied to the brood by the nurse-bees is brought in contact with them, when a luxuriant growth obtains. This produces a fermenting, decomposing food unfit for the brood, and sets up a ferment, a decomposition within the bodies of the bees, thus destroying their lives. This might happen to the host with any form of parasitic life, either animal or vegetal.

It might be said, speculatively, that the disease had its origin in starvation, and that in some cases several putrefactive bacteria of similar biological character were responsible for this malady, which, when once started and undisturbed, becomes as destructive as the old-fashioned foul brood. The two germs isolated having similar, or the same, biological characteristics, especially an alkaline medium in common, are both in a measure responsible for this disease, and perhaps the variations, the malignancy, etc., are due to modifications by their combined action. It is, evidently,

now due to a specific germ, *Bacillus milii*: the other, perhaps purely accidental at first, on account of its requiring more oxygen, is now found in the thorax among the respiratory organs.

While it has not been clearly demonstrated by facts, practically, it appears to be true that perfect bees, especially nurse-bees, are injured by the infection.

DIFFERENTIAL DIAGNOSIS.

Foul brood, pickled brood, and black brood. Foul brood, due to *Bacillus alvei*—a specific bacterium.

Pickled brood, due to *Aspergillus pollinis*—a specific fungus.

Black brood, due to *Bacillus milii*, modified, perhaps, by *Bacillus thoracis*, specific bacteria.

Black brood may be introduced into a healthy colony through infected food or infected combs—combs from which the diseased brood has been removed, or in which particles remain. The food for the young larvæ, either from its chemical reaction or from its lack of nitrogenous substances, is not a suitable medium for immediate growth of the germs; but when the chyle-like food is furnished the older larvæ, a chemical change in the food produces a change in the liquids of the bee, which become a suitable nutrient medium for their rapid development and dissemination. It would appear that, in some cases, *Bacillus thoracis* was the cause of death, as the spiracles, or openings admitting air to the respiratory apparatus, were closed by the products of decomposition or the result of it. In such cases it is usually nearly matured bees that are choked for want of air. These did not show the discoloration or shapeless mass which always obtains when *Bacillus milii* is found in the abdomen. This latter germ, multiplying rapidly in the rich nutrient medium of the alimentary tract, may destroy younger brood than the former. It is often found in other parts, and is certainly the cause of the dark masses of rotten brood. Both germs are found in the same comb, and often in the same bee, thus insuring a mixed infection.

SYMPTOMS AND COURSE.

Brood is usually attacked late in the larval life, and dies during pupation, or later when nearly mature and ready to come forth through the chrysalis capping. Even after leaving the cell they are so feeble that they fall from the combs helpless. Most of the brood dies after it is sealed. In this it is much like pickled brood, except that as much or more brood dies in the late larval stage than in the pupa. In foul brood, while brood of all ages dies, yet more dies "at the ages of 6, 7, 8, and 9 days than at any other age" (author's Foul Brood, p. 46), even before the rich chyle-like food mixed with pollen is given, which is such a necessary environment for pickled brood and black brood.

When the larvæ show the first signs of this disease, there appears a brownish spot on the body, about the size of a pinhead. The larvæ may yet receive nourishment for a day or two; but as the fermentation increases the brown-

ish spot enlarges, the larva dies, stands out, swollen and sharp at the ends. In this they are like pickled brood, except that the brown spot is not present in pickled brood, but pickled brood sometimes becomes brown after death. Foul brood turns brown only after the action of putrefactive germs have brought about decomposition. No decomposition from putrefactive germs takes place in pickled brood. In *black brood* the dark and rotten masses, in time, break down and settle to the lower side of the cells, as a watery, syrupy, granular liquid—not the sticky, ropy, balsam or glue like semi-fluid substance of foul brood. It does not adhere to the cell walls like that of foul brood; has not the characteristic foul odor which attracts carrion-flies, but a sour, rotten-apple smell, and not even a house-fly will set her foot upon it. Cappings in foul brood are sunken in the center when broken, sometimes puffed out by internal gases. In *black brood*, the cap is disturbed from without, sometimes uncapped, and cell contents removed by the bees; not so in foul brood. The cap in pickled brood is usually undisturbed. The decayed brood masses do not adhere to the cell walls like either of the others.

During a good honey-flow, of a few weeks' duration, if the colonies are strong, *black brood* and pickled brood entirely disappear so far as appearances go; and even in foul brood, colonies seem for the time to improve. The most common causes for this apparent improvement are that in *black brood* and foul brood the old foul combs are filled with honey instead of brood; and eggs are laid in cells hitherto not used for brood, and in new combs when comb building is going on; or where comb-foundation is used, the queen takes advantage of this and deposits her eggs before the cells are drawn out and filled with honey. Again, proportionately, there is less brood-rearing and more comb-building during a heavy honey-flow in strong colonies than in weak ones. In weaker colonies these diseases do not disappear, as more brood is reared and less comb is built, in proportion to the mature bees, than in strong ones. In pickled brood the infection is in bad pollen: nice new pollen always causes it to disappear. Why these diseases should recur when there is a dearth of honey in the field, would be of interest to many.

In strong colonies, as we have seen, proportionately less brood was reared during the honey-flow, and now we have fewer bees to keep up the strength of the colonies against the normal death-rate. Again, the brood is gradually finding its way back to the center of the brood-nest, where there are many infected cells which were filled with honey during the rush of the honey-flow. These, with inclement weather and other unnatural surroundings, are conducive to recurrence. Often new pollen is stored on old infected pollen—in the same cell—and when this new pollen is exhausted, and no other to be had, the old pollen must be used; hence a recurrence of pickled brood.

REMEDIES.

The best time to effect a cure is during a honey-flow.

Adopting a modified McEvoy plan:

Make your stocks strong by uniting; place them upon comb-foundation starters, and cage the queen. After five days remove the starters and make them into wax, and give full sheets of foundation—keeping the queen caged five days longer. This will give time for all infected mature bees to have disappeared before any brood is reared.

Don't try to save infected mature bees by drugs. They are not worth the trouble; yet salicylated syrups,* during a dearth of honey in the field, would in a measure prevent a recurrence, but would not cure the disease. It would not destroy the germs, but prevent their growth, by placing them in an antiseptic† medium.

If a cure is contemplated when little honey is coming in, the above modified McEvoy plan should be observed in every detail, and the bees fed with salicylated syrups until the combs are well filled, so that all food may be rendered antiseptic by the time brood-rearing begins.

Great care should be taken to melt all old combs and removed starters into wax at once. Do not use a solar extractor, but remove the material at once to hot water or a steam-extractor. Until further investigations shall reveal the longevity of these germs in open air, I shall recommend a thorough disinfection of the hives, frames, etc., by boiling in linseed oil for half an hour. This would not injure hives or fixtures; besides, the high temperature reached would insure thorough disinfection. Careful, practical, and experimental work, coupled with microscopical investigations in the presence of this disease when at its worst, will, I feel confident, discover some practical plan for its successful eradication.

A MODEL APIARY.

Essentials of Success in Comb-honey Production; tall Plain Sections.

BY J. W. YOUNG.

So far I have been quite successful in this business, although at times I have had considerable loss in wintering, but have learned that, by having all colonies strong in the fall, and provided with plenty of stores, they will usually come through the winter in good condition. They are all in chaff hives on their summer stands, as can be seen by the photograph which was taken in the month of December last. To-day, Jan. 19, the bees appear to be wintering nicely, and were out flying as lively as in the summer season, something very unusual in this locality at this time of year.

Starting in a small way I have gradually increased my apiary until now I keep about 80 colonies, which is about all I am able to attend to with my other business.

*Sodium salicylate one ounce, water five gallons, white sugar forty pounds. Make syrup without heat.

†Antiseptics prevent germ growth. Disinfectants destroy the life of germs, by actual contact only.



APIARY OF J. W. YOUNG, YOUNGS, NEW YORK.

This part of York State is a very fair locality for bees, and a good many are being kept by the farmers and others in this and near-by towns.

By trying at all times to place a good article on the market in the best possible condition I have, during the past few years, built up a fine home trade so that I am able to dispose of nearly all my honey at home and in near-by towns. The honey crop was very poor with us the past season on account of the great drouth, so I was quite unable to supply the demand. I run my apiary mainly for comb honey, producing only a small amount of extracted to supply the local demand.

I used the tall sections with cleated separators in a small way during the past season, and am favorably impressed with them, so that I shall use more this year, and will also try using the fences in some of my supers with narrow $4\frac{1}{4}$ sections.

Youngs, N. Y.

NOTES FROM THE ONTARIO CO. BEE-KEEPERS' CONVENTION.

BY F. GREINER.

The bee-keepers of Ontario Co. seldom fail to have a profitable meeting. Their annual convention was held Dec. 14 and 15. So many good things came up that ought to be known in wider circles that I will pick out some of the good things for the benefit of the readers of GLEANINGS. Through the influence and by the aid of the Bureau of Farmers' Institutes we were fortunate enough to have Prof. F. Benton, of Agricultural Department, Washington, with us, and naturally every thing centered around him. From his several lectures I make the following extracts:

FERTILIZATION OF FRUIT-BLOSSOMS BY THE BEES.

The cross-section of a matured apple shows five separate seed-chambers grouped around the center in star shape. The pistil of the ap-



ple-blossom is also in five sections, with conductors leading to these embryo seed-chambers, and unless a grain of pollen reaches each one, the fertilization is incomplete—a perfect apple can not form. Perfect fertilization requires five different acts. An apple-blossom has many stamens, and the pollen is produced at the extreme end of each one, forming there an enlargement called “anther.” A single anther contains one million or more grains of

pollen, of which but five are needed for the fertilization of one blossom. A raspberry-blossom is built differently from the forenamed one. The raspberry (fruit) is composed of some 200 separate little sections, each containing a seed, and so the blossom is constructed in a like manner. What will later be the fruit is already present in an embryo state, 200 little sections in miniature, and from each of them protrudes the pistil, like a fine short hair. A grain of pollen must be conducted through every little hair—really a tube, the end of which is receptive through the organ called stigma. A bee, after alighting on a blossom of this kind in search of honey, which is to be found at the base of the blossoms, rubs over the anthers with its body, which is covered, especially on the under side, with many hairs of a compound feather-like nature, and becomes covered with the pollen dust. Whirling around, first one way then another, in order to reach fully all the nectar-secreting glands, it brushes again and again over the 200 protruding pistils. One bee after another visits the same blossom at short intervals as long as the secretion lasts; and in time every one of the stigmas receives its grain of pollen, and a perfect fruit results.

During the earlier part of the season, when pear and apple trees bloom, the weather is often unfavorable for pollination; the pollen remains too moist and sticky. In such a case, not much fruit can set. Should the sun come out for but an hour, the pollen becomes dry. The bees turn in; and the more numerous the bees are, the more fruit will set. There may be seasons when fruit would set abundantly without the help of honey-bees. In an unfavorable season, however, they are an absolute necessity. Cross-fertilization is strictly necessary for raspberry, gooseberry, and huckleberry. When the bee visits a blossom of the last-named kind, and pushes its body into the bell-shaped flower, it seems that the stamens are so arranged that the white pollen is dusted upon the head and thorax of the bee. The bee is unable to remove the dust from these places; and when the next blossom is entered, the head and thorax of the bee come in contact with the stigma first, and before the anthers are touched, and in this manner cross-fertilization is assured.

It would take too much space to go through the long list of flowers benefited by bees. However, bees are not the only agents to perform this work. There are other insects and the wind. In the early springtime bees are most numerous, and therefore indispensable.

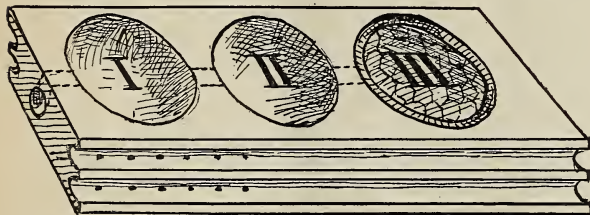
Some pollen is not utilized by the bees, probably on account of coarseness or peculiar shape of the grains.

QUEEN-REARING, AND FEATURES CONNECTED WITH IT.

The professor had used artificial queen-cells made of many different materials—acorn-cups, paper, gauze, and glass. The latter were used with fair success and a great deal of satisfaction. From a glass tube of proper size, short pieces were snapped off by means of a heated wire. The ends only of these pieces were

touched to melted wax, and each was quickly attached to the top-bar of a frame. A little hot wax was dropped into the tubes to form the bottom of the cells, when they were ready to receive the royal jelly and larvæ of suitable size. Cells prepared thus were accepted by the bees, and finished up. After being sealed, the wax coating that had been added by the bees was carefully removed from the glass parts of the cells, when the development of the larva to pupa and perfect queen could be noted.

A most unique experiment the convention was greatly pleased with, and certainly does Mr. Benton great credit. In the Benton shipping-cages an improvement had been made. As he stated, the customary cage is made out of an oblong block with three holes bored in it, and overlapping each other. This feature Mr. B. objected to. A thin wall should be left standing between these holes, connecting them by a smaller perforation through the walls, which may be effected by boring a small hole from the end into the cage. Formerly the sides of the cages were made flat or smooth. Packed tightly in the mail-bags it might cause a lack of ventilation, which can be easily insured by grooving the long sides of the cages

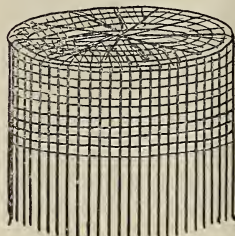


BENTON SHIPPING-CAGE.

as shown in the drawing, and boring, *not punching*, the little holes for ventilation from the grooves into the cage. By thus *ventilating only chamber I*, the bees may retreat to compartment II, if they should find it more congenial there. In fact, here they *will* generally be found clustering.

A cage that had been used on long journeys several times was shown around. It was coated inside with bits of newly secreted, white wax by the bees that had occupied it, proving thus how comfortably they must have felt. The food consists of pulverized sugar and honey kneaded to a stiff dough. Before it is put into the cages, compartment III is slightly rimmed out at the top edge with penknife or other suitable tool, and coated with beeswax. The food is carefully put in, a piece of comb foundation (heavy) of circular shape and proper size laid on the top for a cover, and sealed down with the hot blade of a knife or screwdriver. Protected and hermetically sealed on all sides, except the little place where the bees have access to it, the food will keep in good order for a year or more. In some instances, when the food had nearly all been consumed the bees had drawn out the cells of foundation on the under side to some length.

Mr. B. prefers for an introducing-cage the one illustrated by F. Greiner in *GLEANINGS* over a year ago, and later by Mr. Hutchinson in the *Review*, but made more substantial by rolling an oblong piece of wire screen around a two-inch-thick round stick, fastening the ends together. He closes up one end of the



INTRODUCING-CAGE.

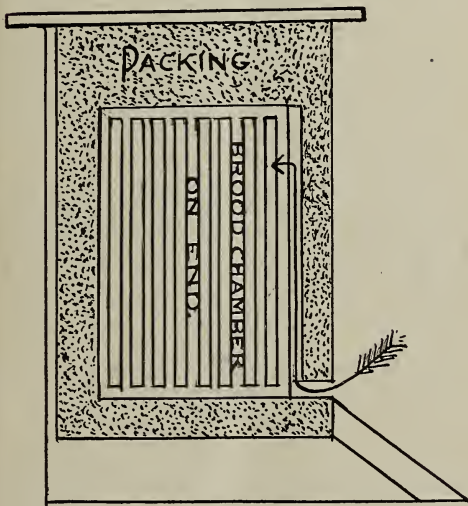
thus constructed gauze tubing by first making many incisions with a pair of tin-ner's shears, about an inch deep, then bending over and hammering down over the end of the stick. After being thus treated it is taken from the form, laid down on the bench, closed end down, and newly built comb is mashed into it to make the top solid, and covering or hiding all wires. The open end of the cage is raveled so the straight projecting wires may be pushed into the comb. Mr. B. does not deem it essential to cage a queen on brood.

Miscellaneous subjects were touched on by

Mr. Benton in course of the day, as "Improving Bee Pasturage," "Good Winter Hive," etc. But little can be done about improving bee pasturage except, perhaps, sowing such things as clovers, buckwheat, etc.; but Mr. B. had noticed, when he first moved his large apiary into Maryland, that a change took place in the flora, caused by the bees themselves. There was at the time a white aster present in limited numbers among other varieties of asters, which latter by far outnumbered those first named. Only the white asters were visited by the bees to any extent, but on them they worked steadily. Not being enough of the asters, no gain in the hives could be noticed. But as the years wore on, the white asters increased. The bees in all probability assisted those blossoms in cross-fertilization to such an extent that plenty of seed was produced where before only a few grew to perfection. These seed became scattered, more plants grew up and produced more seed, etc., *ad infinitum*. Now there is a good stand of white asters everywhere, and they have almost driven the other varieties to the wall; the bees also reap now a plentiful harvest from them. A hive on scales has made a gain of 7 to 8 lbs. some days, which, however, fell back during the night by a third. On this account it seems this white aster might be introduced into other sections to good advantage. The plant can hardly be called a bad weed or a pest. There are plenty of blue asters growing all over the country. If the white species could be substituted it would certainly be a boon to the honey industry. The yield, however, comes late in the season, somewhat like the golden-rod Mr. Hershiser reported last year; and in order to secure the best results, Mr. Benton

found it necessary to keep on feeding his bees clear up to the time asters commenced yielding, in order to have them continue breeding. Only by this method was he able to secure good results. On this account Mr. B. had added a permanent feeder to his hives, enabling him to feed at any time without removing quilts, supers, or the like.

As regards wintering bees on summer stands, Mr. Benton has tried a new method with good success. An outer case is made use of, and the entrance is so well protected that neither wind nor sunshine can possibly hit it. The brood-chamber is stood on end, the rear uppermost, and the combs running flatwise with entrance, imitating the "Warmbau" of the Germans. The illustration shows plainer than words can do it, so here it is.



Pretty sensible idea, is it not? Perhaps the same method may be used with good success without turning the hive on end, simply by turning the hive a quarter way around and boring a 1½-inch hole about two inches below top-bars for an entrance, and then packing as shown.

Among the questions asked were the following:

1. Do you prefer wintering under sealed cover or quilt and packing?

Answer.—Quilt and packing is best.

2. How keep moths out of combs?

Answer by F. Benton.—By use of bisulphide of carbon.

Greiner stated that he burned sulphur in a top story over a stack of combs or comb honey, then aired after. Sulphur fumes do not injure the health of human beings, but bisulphide of carbon does. Care must be exercised with the latter.

From a paper read by F. Greiner, entitled "Things are not Always what they Seem," I make the following extract:

"Friend Lapsley expresses an opinion in GLEANINGS that beginners are sometimes misled by veterans. The introducing-cage,

made of wire cloth only, and mentioned in this report before, is a thing that is not what it seems, because it does not work in friend L.'s hands as represented. In order to be brief, and not occupy all the room there is, writers often refrain from going minutely into all the details, supposing the readers are able to read between the lines. Sometimes readers do not catch on, and failures result, even with good and experienced persons, as, for instance, Mr. L. If the introducing-cage is made from proper cloth, stiff enough, there will be no trouble."

The Doolittle method of ascertaining the amount of stores by lifting and weighing in one's hands each frame (comb), thus guessing the weight, undoubtedly proves a success in the master's hands; but it might not in the hands of many others. Greiner does not like to tear all his colonies to pieces in such a manner, particularly at a time when robbers are troublesome. Weighing the whole hive on scales he preferred, and this was indorsed by Mr. F. Benton. A guess has to be made on the weight of the empty hive, the combs, the bees, the pollen, etc.; but even this does not leave the sum total any more uncertain than Mr. Doolittle's guessing the weight of each comb, and is much less work.

The queen-clipping device advertised in some papers may not be what it seems. It requires much fussing, and G. claims he can clip three queens without that instrument to one with it.

The wax-moth has two broods, according to Mr. Harry Howe, and Entomologist F. Benton indorsed this in a measure. Greiner could not see any noticeable let-up in their breeding throughout the season.

Many implements are recommended and used for scraping propolis from section-holders and hives. Some seem flimsy. A piece of steel from a crosscut saw, 3×6 inches, serves better than any thing else.

The bee-escape was also hauled over the coals. A few prominent men do not seem to recognize it as possessing any great merit. It does not, under all conditions, do the work required; but when properly used it is a very pleasant auxiliary in the apiary.

In another paper, on comb-honey supers, Greiner spoke of the gradual development of the soap-box into the one-pound-section super of to-day. He had used T supers, combined honey and shipper's cases, and several other styles, but uses almost exclusively a wide-frame super. He thinks separators indispensable, and uses them, even at the risk of being called unskillful. The market demands honey of uniform weight and perfectly smooth faces. Such honey can not be produced without separators. The cleated separator is in favor with him, also the tall section, 4×5 inches. Fences he is not going to adopt. His experience with them leads him to advise making fences of hard wood to prevent the bees from enlarging the spaces between the fence-boards. Perforated separators suit him better than fences; he used them years ago, and honey produced between them showed perfectly smooth faces.

A paper read by Mrs. S. J. Smith, entitled "Bees versus Man," greatly pleased the convention. Mrs. S. has a poetical turn of mind. It is not the first time that she has given the members of the Association a treat of that kind.

Mr. H. S. Case exhibited and explained his little feeder which is used in the spring for stimulating. It is placed on top of the brood-frames, covered up with quilt and packing, a long spout running clear to the outside of the hive, by means of which it can be filled easily and quickly without disturbing the bees in the least.

Naples, N. Y.

RENDERING WAX FROM OLD COMBS.

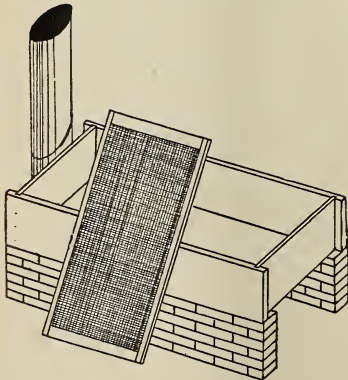
How to Make a Large Wax-tank at Small Expense.

BY S. C. LORD.

At best the rendering of old combs is not agreeable, and at the first attempt I saw the need of a simpler method than the crude one generally employed in this section. After some study a plan occurred to me, but which, however, I did not put into practice until Mr. A. W. Hatch, of Redlands, having employed me for a few days about his apiary, suggested the same plan; hence the idea is not mine exclusively. On trial the result was most satisfactory. Here is the method:

Make a pine box of any convenient dimensions, say 6×3 ft.×16 in., preferably of 1½-inch or 2-inch plank. Grooves should be cut about two inches from the ends of the sides, into which fit the end pieces. For the bottom, nail on sheet iron, driving the nails about an inch apart to render the box water tight. Mount this box on a brickarch, one end being left open for stoking, and the other fitted with two lengths of stovepipe.

Now make a frame which will fit tightly into the tank, and cover the same with wire window-screen. Here is a sketch which will make these specifications more lucid:



Fill this tank half full of water; cover up, and build a lively fire. When the water boils, put in your old combs, a few at a time, throwing out the frames as soon as all the wax has

melted from them. From 200 to 300 frames can be disposed of at one rendering.

After stirring awhile, place the wire screen in the tank; press the whole mass below the surface two inches, and fasten the frame there by nailing vertically four small cleats on the inside of the tank, near the ends. Cover the tank, and keep the fire burning for an hour longer.

The next morning the wax may be removed and the under side scraped, or further refined, if thought necessary, by reboiling in a smaller vessel. The point, however, on which I lay the greatest stress is that, by this method, the amount of wax lost is reduced to a minimum.

On my first trial I scraped up and rendered about four bushels of slumgum, the refuse of a day's work by the old method, and was surprised to find that I had saved two dollars' worth of clean bright wax.

As a test of the efficiency of this method the good wife of Mr. Hatch, an excellent bee-keeper herself, endeavored to burn some of the residue after it had become dry, but reported that it would not burn, thus showing that there was little or no wax left in it.

Redlands, Cal.

[I have no doubt that your method of wax-rendering will work very satisfactorily; but one ought to be a fairly good mechanic to make a vat or tank of wood and metal to hold water or wax.—ED.]

APIS DORSATA.

The Length of their Tongue Compared with that of Italians..

BY PROF. B. F. KOONS.

Dear Bro. Root:—Yours concerning bees and rack, also the packages of the same, were duly received. I have made careful measurements of the mouth parts of a part of the bees, with the following results expressed in thousandths of an inch:

No. 1, .220	No. 2, .240	No. 3, .215
No. 4, .170	No. 5, .170	No. 6, .174
No. 7, .173		

I have also gone to my own hives and got some Italians; that is, I take them to be quite pure, and I examined a lot of them in the fresh stage, not alcoholic, and find the following in thousandths of an inch:

No. 1, .214	No. 2, .213	No. 3, .230
No. 4, .220	No. 5, .228	No. 6, .232
No. 7, .226	No. 8, .210	No. 9, .228
No. 10, .225	No. 11, .215	No. 12, .199

You will see that there is a very wide variation in the *Apis dorsata*, and a much greater uniformity in my fresh Italians. I fear that the alcohol has vitiated the record in those you sent, as alcohol is a *drier*. It coagulates the liquids, takes out the water, hardens, etc. I notice that, in preparing the mouth parts of my fresh bees for the microscope, often the tongue is retracted so as to be little longer than the labial palpi; but by gently pressing the base, the tongue will extend as it is usually figured in the books, but in the alcoholic spec-

imens the short tongues refuse to respond to pressure; hence I infer that when the bees were put into the alcohol, the tongues were retracted, and became hardened in that position."

I have examined some alcoholic Italians, and find some of them quite as short as the *Apis dorsata*.

My reason for asking that live bees be sent was that they could be examined in their normal condition; and I suspect that *that* is the only way to arrive at trustworthy results. I do not regard the measurements on *Apis dorsata* above at all reliable. Is there any one who can send me two dozen dorsatas alive in a shipping-case? Even if they should die they will still be fresh when they arrive, and unhardened by alcohol. I am interested in this question, and should like to follow it through to trustworthy results.

As to the stone, you make the common mistake. It is a piece of petrified coral, fragments of which are often found over the central parts of the United States. It is an old coral which grew there when the ocean covered that part of North America, millions of years ago, in the Silurian age. I recall finding them scattered over the fields when a lad, a little to the southwest of you, as I was born and grew up on a farm over in Crawford Co., near you. If you desire to keep the stone (it is very common in Ohio) I'll send it back with many thanks for letting me see it. From the remark in GLEANINGS I thought it was something new. If you do not care for it I should like to put it into my collection.

Storrs, Conn., Dec. 26, 1899.

[I would explain that I sent a number of alcoholic specimens of *Apis dorsata*, that we received from Mr. W. E. Rambo, to Prof. Koons, asking if he could not measure their tongues. This he has done, and the result is here shown. Of course, I should have preferred to send him live specimens, but as we were not able to obtain any we had to take what we could get.—ED.]

MATING OF QUEENS.

Does it Ever Take Place a Second Time? an Interesting Case.

BY PROF. C. F. HODGE.

Referring to discussion on p. 52 of GLEANINGS (Jan. 15), I may state the facts a little more explicitly, and then give my own interpretation, which differs from any of the three you suggest. And, first, as to the double mating in this one case, there is no chance of mistake. I saw this queen emerge from her cell, watched her between about 10 A. M. and 2 P. M. each day until she flew, and for some days after. I saw her go out the first time, timed her trip with watch in hand, 8 minutes, saw her return with organ of drone, saw the bees catch hold of and draw it out. Whether the bees took away too much, thus making it necessary for her to fly a second time, I can not say. I could plainly see a filament slowly pulled out

of the queen's oviduct, and, under the stretch caused by the bees tugging at it, it appeared nearly $\frac{1}{4}$ of an inch long. The bees then did a great deal of brushing and combing and feeding their queen, and, as I have said, within 15 minutes she went straight out of the hive and off. In a somewhat shorter time, 5 minutes, she again came home with a second male organ, appearing exactly like the first. The bees immediately set about removing it exactly as before. If they took away too much the first time they did so the second, so far as I could see. But the queen soon began to lay, and all her eggs hatched workers, so fertilization was accomplished.

I do not feel that it is worth while interpreting a single case. It should certainly not throw any doubt on the time-honored one-flight theory, until, at least, a number of such observations are recorded. My own casual explanation is simply that, for a brief period, the queen feels the need of fertilization and the impulse to fly. If the male organs are removed promptly, before her body has adjusted itself to the change, the impulse persists and she flies again. Females of many animals have these definite periods of impulse to mate, and this, we may say generally, persists for a longer or shorter time after actual fertilization occurs. As to evidence for such double fertilizations being somewhat common, I have had one hive, among the seven or eight, in which some of the bees appeared to be pure Italian, and the rest almost as pure native, the queen being a daughter of Italian stock. This would not show, of course, if both or all the drones happened to be either black or Italian. About Worcester there are probably more black bees than any thing else, and pure stock is sure to hybridize very quickly. I may add that a beekeeper here, to whom I related the circumstance, said immediately, "That explains why some of my queens lay both black and Italians."

When we get more observation hives in our schools we may gain additional light on a good many such interesting questions, which we old folks have no time to follow up. It happened to be vacation, and I was determined to learn that one queen's story from A to Z. I wonder how many others in the history of apiculture have watched a queen continuously enough to be absolutely sure that she mated only once.

Worcester, Mass.

[If Prof. Hodge were not a scientific man, one who realizes the value of careful and accurate observation, I should be almost inclined to discredit his statement; but as he personally saw what he relates, I think we shall have to admit that at least one queen was fertilized twice. The probabilities are that the first meeting of the drone was rendered ineffective by the act of the bees in pulling away the drone organ.

It would be interesting to know whether this is liable to happen with any queen; but even then I should feel morally certain that, after the organs of the drone were once absorbed by the queen, this would be the last time she would take her flight. I have never yet seen a well-authenticated case from a compe-

tent observer, where the progeny of one queen, after she had raised one litter of bees, so to speak, would be changed in the next or any subsequent litter. I do not believe it has ever happened; that is to say, when the act of copulation has been fully accomplished, and the queen begins laying, she does not, in my humble opinion, ever meet the drone again.—ED.]

INSPECTOR'S OF APIARIES REPORT.

Foul Brood in Canada Nine Years Ago and Now;
Good Work Done.

BY WM. M'EVROY.

During 1899 I visited bee-yards in the counties of Haldimand, Norfolk, Middlesex, Oxford, Brant, Wentworth, Lincoln, Wellington, Halton, Peel, York, Ontario, and Simcoe. I inspected 126 apiaries, and found foul brood in 47 of them.

In places where I had never been before is where I found nine-tenths of the foul-broody apiaries the past season, and over three-fourths of the owners of these diseased apiaries did not know that their colonies had foul brood when I first visited them.

I took the greatest of pains to explain to the bee-keepers how to manage the business so as to have every colony a good strong one, and in fine condition when they were cured of the disease.

In looking back over the nine years that I have inspected the apiaries in the Province of Ontario I noticed that I had found foul brood very widely spread through 30 counties. I succeeded in getting thousands of foul-broody colonies cured and the disease driven out by wholesale, and peaceful settlements made in every case where diseased stocks were sold through mistakes of the parties selling, not knowing of their colonies being diseased at the time of sale.

Nine years ago very few among those who kept bees then were able to tell the disease from other kinds of dead brood, and not over half a dozen men in Ontario could cure an apiary of foul brood, and end the season with every colony in first class order. The instructions that I gave while on my rounds through the Province, and the driving-out of the disease by wholesale, will make Ontario one of the safest places in the world to keep bees in.

Mr. F. A. Gemmill, of Stratford, Ont., is the man who deserves the credit for all the work that I have done, and the government of our country that has paid for it.

In 1890 Mr. Gemmill took hold and worked hard until he got the foul-brood act passed which has proved to be a great benefit to hundreds of bee-keepers.

I am greatly pleased with the way the bee-keepers took hold in the past season and cured these apiaries of foul brood.

Where I found a few worthless colonies almost dead from the disease late in the fall (and near fine sound apiaries) I burned them.

The total number that I burned in the Province was 20 colonies, after the owners and I had reasoned out things nicely together.

For the courteous and very generous way that I have been treated by the bee-keepers of every locality that I went into I return to them my most heartfelt thanks.

Woodburn, Ont., Can., Dec. 4.

[If it had not been for the foul-brood law that was enacted some time ago in Canada, and for an efficient foul-brood inspector to carry out its provisions, there is a possibility that bee-keeping in Canada might have been almost entirely wiped out. But how did foul brood get so fearful a start? I have been told that a bee-keeper who conducted quite a large business in selling bees years ago said that foul brood was not to be feared, and was not as careful as he might have been to ship entirely healthy stock. The result was, that the disease got scattered all over the country. However that may be, not only the bee-keepers of Canada but of the United States owe Wm. McEvoy a vote of thanks, even if he has been paid for doing his work; for one less tactful and less skillful than he would have been able to accomplish much less than he has done.—ED.]



SMALL, BROOD-CHAMBERS.

A reader of GLEANINGS, living at Miami, Ohio, seems to have some trouble in grasping the thoughts I put on paper on page 49 of the January 15th issue, so with the permission of the editor I propose to have a little conversation with him by formulating what apparently is in his mind into questions, and have a little talk with him, just as I should expect we would talk were he here before me, and we talking face to face.

"Mr. Doolittle, you say on page 49 that you started with the Gallup hive holding 12 frames and changed to one holding but 9 frames. What were the first things that led you to make this change?"

"I hived first or prime swarms in these hives, waited a week or so, as the books told me to do, and then put on the surplus arrangement for comb honey. At the end of the white-honey harvest I had little honey in the sections, but found three or four of the outside combs on each side of the hive nearly solid full of sealed honey, one or two of outside ones on either side showing, by looking through them, that they had never had even one cell of brood in them, and very little pollen."

"Well, was not that a good condition for the colony to be in at the close of the harvest? Mr. Aikin and others are telling us that such a state of affairs insures good conditions during the winter, and is just the thing for large quantities of brood in the spring, as, with plenty of honey in the hive, the bees will not restrict brood-rearing from fear of running short of stores."

"Yes, I know all about this line of reasoning; but when I saw that amount of nice white honey in those frames, certainly 25 pounds more than was necessary for the colony before May 1, I could not help the feeling coming over me that such white honey, if in the sections, would be a salable article, while that coming later on would be just as good for wintering, but not so salable, on account of its darker color, as 'white-clover' honey (all very white honey being called such in market), brought fully a third more in price than that from buckwheat and fall flowers. So I concluded that the next year I would try some hives with dummies, in the place of three combs; and if there was not honey enough to supply the bees' wants, without their having fears of starvation, I would feed."

"Well, how about the results?"

"The result has been that, with the exception of three seasons, I have not had to feed at all, and two of these but very little. One year I not only had to feed in the fall, but had to feed several barrels of sugar in the spring; but during the nearly 30 years I have used these small brood-chambers, I have not had to feed more than an average of one pound of sugar to the colony, if it were spread out into years."

"But that is not just the part which I do not understand. You say that you not only secured the 25 pounds that was placed in the three outside frames, in the sections, by using three dummies in the place of the three frames, but that the 10 colonies so worked averaged over 40 pounds more comb honey than those left with the 12 frames as at first. Do you mean to say that the nine frames produced 40 pounds more than the 12 frames?"

"No, not just that. Frames never produce honey, any way. What I did mean to say was that, by using only nine frames in a hive, the bees and queen were placed in such a condition relative to their surroundings, that these 10 colonies were enabled to give me 40 lbs. of honey in the sections, on an average, over and above what those did which were still left in 12-frame hives."

"But how did you get those 25 pounds that were in the three frames (substituted by dummies) into the sections?"

"I did not get just *that* honey into the sections at all; for after it was once stored in the combs I could not touch it toward placing it in the sections (nor as extracted honey, for the extractor was little known at that time), only as I placed frames of honey in hives when I hived new swarms, in which case very likely some of it found its way into the sections, mixed with that coming in from the field. However, the most of these filled combs were used in colonies which were bent on building drone comb, where such filled combs were of the worker size of cell."

"You say that, when you used 12 frames in a hive, your average queens would occupy only about 800 square inches of comb with brood, but with the 9 frames, all were nearly filled and occupied by the queen. This would be 1050 occupied, when using the 9 frames. How is this? I can not understand it."

"I presume I was not quite explicit enough in what I said on page 49. It is almost impossible to get all the minutiae of a thing into one article. If you will read the article again you will note that the 600 square inches of comb in the 12-frame hive, not occupied with brood, was 'filled with honey and pollen.' And as no pollen should ever go into the sections, a part of the 1050 was occupied with that, say from 50 to 150 square inches, according to the time of year and yield of pollen from the flowers."

"But what about the other 150 to 200 still not accounted for? Did the three inserted dummies increase the capacity of the queens that 150 inches?"

"Yes partly. When bees commence to store honey in the brood-combs to any great extent before they go into the sections to work, they will crowd with honey the room the queen would otherwise occupy with brood; so where bees do thus commence, we will, as a rule, have less brood in the hive than where the bees commence in the sections at the very commencement of the honey-flow. The other 'partly,' is accounted for by the fact that bees will always have a few cells of honey scattered about among the brood, as well as pollen, and also some little honey in the extreme upper corners of the frames. There are very few frames indeed that are *absolutely full* of brood; but with the 9-frame hive very many approach very nearly to the absolute."

"But if the three outside combs were *full* of honey in the 12-frame hive, how could there be any difference regarding empty cells? In other words, how could the substitution of three dummies for three combs of honey produce less empty comb in the hive for the bees to deposit honey in at the beginning of the harvest?"

"If you are conversant with the interior of the hive in the spring of the year, and during winter, you have noticed that, during every warm spell, the bees will break cluster and stampede over to the outside of the outside frames or combs, and carry honey from them and place it in the cells immediately surrounding the cluster. This they do to insure, as far as possible, their not being caught during some cold spell without honey within their immediate reach. And thus we always find that during spring, or up to the honey-flow, the outside combs have many empty cells in them, and these are the cells into which the first honey from our flow of nectar goes, if they are allowed to remain there. Having once commenced to store in these cells, the result is a continuance of the same, and a brood-chamber crowded with honey, as I have before stated. Perhaps I put it rather strongly when I allowed the impression to go that these three outside frames were *always* full of honey, and I wish this explanation to be taken together with the other. If the combs were always full of honey, there would be no loss, over the dummy plan, after the first filling of the three combs. The loss comes more from the provocation toward the crowding of the queen than otherwise, though I now see I did not make that matter quite plain on page 49."

"Do you think 6 Hoffman frames would be large enough for the brood-chamber? I think you have recommended that number."

"If my sole object was comb honey, allowing the bees to swarm, as most bee keepers do, I should prefer six Hoffman frames to eight or ten; but seven would be more nearly the right number, in my opinion, if it was necessary to have any set number. But from my present standpoint I should prefer a ten-frame hive, and then use five, six, seven, eight, nine, or ten Hoffman frames, just in accord as I found the queen was using, five days before the expected honey-flow, filling up the unused space with dummies. The amount of comb occupied with brood just before the flow commences is the right number of frames to have in the brood-chamber during that flow, if we would secure the best results. This is the candid opinion of Doolittle."



[I solicit questions for this department; but they must be put on separate slips of paper, and marked "GLEANINGS Department." If you desire an immediate answer, say so at the time of writing, and a private reply will be sent you in advance before your question with answer appears in these columns; but questions that are mixed up with business matters will not only be subject to considerable delay, but possibly will receive no answer at all.—EDITOR.]

KEEPING BEES NEAR SUGAR-REFINERIES.

I am situated within a mile of the three largest sugar-refineries in this city. Would it do to keep bees here? and would the honey be of any value if they gathered the sugar? As I am a beginner, please give a brief account.

WM. RYAN.

Philadelphia, Pa., Jan. 11.

[It is a little difficult to say what would be the result. The probabilities are that your bees would visit the refineries, and perhaps make a deal of trouble.

As to the second question, that has been the occasion of much controversy; but I think all chemists are agreed in this: Thin sugar syrup fed *slowly* to bees, and stored in the combs, will be given a honey taste; that is to say, it will be partly digested. After it has been acted on by the bees it assumes a different chemical form; and from the standpoint of a chemist it is inverted, or honey; but on account of the fact that bee-keepers might feed sugar syrup for the production of comb honey, and put the same on the market as *honey*, the practice has always been condemned. No objection is made to feeding syrup for winter feed or for brood-rearing.

Honey has been defined as being the nectar of flowers, gathered and digested by the bees, and stored in the combs. Sugar syrup subjected to the same process has been called sugar honey, but was not regarded as *real honey* by Thos. Wm. Cowan and Prof. H. W. Wiley, United States Chemist.—ED.]

MOVING BEES IN THE DEAD OF WINTER—HOW TO DO IT.

I am going to move to Southern Kansas about the middle of February (about 700 miles); how can I fix my bees so that I can move them with safety? I will have a railroad car with stock, household goods, etc., so that I can be with them. I came from there two years ago next April. The weather was warm, and I tacked wire screen over the top, and they came through nicely; but I have never heard of any one moving bees in cold weather (or it is liable to be at that time). I have looked the last 14 volumes of GLEANINGS through carefully, and also A B C book, but not a word do I find about moving bees in cold weather. My bees are on summer stands, with super on top, with three or four thicknesses of burlap next to the bees, with super filled with oat straw. D. F. D. POMEROY.

Cuba, Ill., Jan. 22.

[Personally we have never had any experience in moving bees in winter, and are therefore not able to give you much advice; but it is a little risky to move bees in carloads in the dead of winter, especially if it should be very cold outside. However, if you *must* move them, place the hives on top of about four or five inches of straw in a box car, and place some straw between the hives, so that, when the cars are bumped, it will not produce a dead shock on the combs, which would break down very easily if the weather was very cold. It might be possible for you to leave the covers right on the hive if the weather is cold; but should it moderate there would have to be some provision by which you could give the bees air. I would, therefore, suggest that you place wire screens on top of all the hives, and then, if the weather is cold, you can put the cover on top of the screen; and if for any reason the bees require ventilation the covers can be lifted. If your combs are of the loose unspaced type it may be necessary to run spacing strips down in between the frames. If any of our readers have had a special experience in moving bees during winter, I should be glad to have them tell us about it.—ED.]

ENLARGING A BEE CELLAR; POINTS OF CONSTRUCTION; CONVEYING BEES TO THE CELLAR.

I wish to enlarge my cellar to 10×18 in the spring, and intended to put in a brick wall and a brick floor with an air-space between it and the outer wall. Do you see any good points? and will not the brick absorb the dampness?

Will bees winter as well when placed in the cellar, as given on page 97, 1899, as if placed in without jarring?

When your bees are in the cellar, just apply your ears and nose at the door, and that contented hum and pure air says Doo-little with me.

C. R. MORTS.

[Dr. Miller prefers a dirt floor; but on this point a great deal will depend on the locality, and the character of the soil. In this vicinity a grout cement bottom is almost a necessity. One of brick would not keep out moisture or water, while that of cement would. If the soil

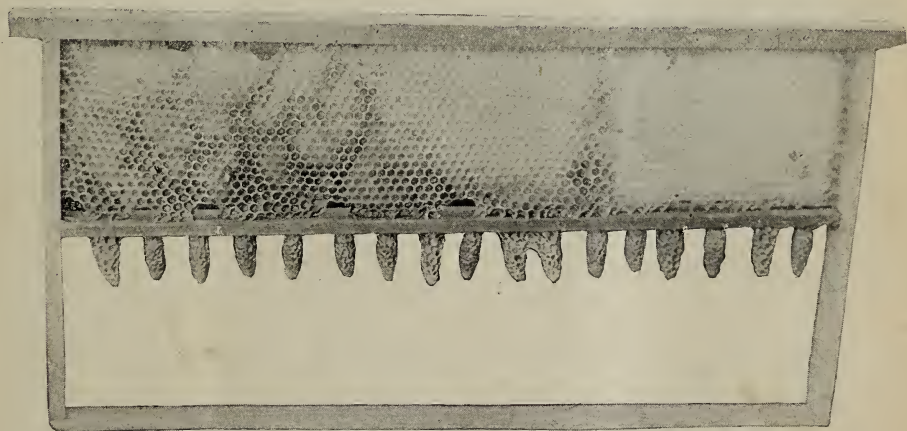
is dry and hard, the ground floor would be as good as or better than one of cement; but a brick floor would have no advantage, and might be a positive detriment.

On looking up GLEANINGS for Feb. 1, 1899, I note that you refer to the method practiced by N. D. West, of running the bees into the cellar by means of a plank shute. Well, now, it strikes me this would be rather rough treatment to give a colony, just as it is about to be put into its winter quarters for its long sleep. One would imagine it would get such an awakening that it would be a long time before it could go to sleep. But Mr. West is an extensive bee-keeper, and does things on an extensive scale, and if he did not get good results he would not practice the plan. But the average bee-keeper, especially if a beginner, would do better to take the colonies into the cellar as gently as possible. I like the plan of carrying a colony or two of them on a stretcher by two men, as shown in a late *Review*.

If the ground in the vicinity of the apiary is nice and level, then a hand-cart with large wheels, without box, but with simply a flat tray, may perhaps be used in lieu of an extra man; but the expense of the extra help is very small, because in one afternoon all the colonies of a yard can be taken into the cellar easily, and perhaps another afternoon or forenoon they can be all taken out. The matter of a day's time once in a whole year, or say \$1.50 with 100 or 150 colonies, would cut very little of a figure.—ED.]

DOOLITTLE CELL-BUILDING.

I take pleasure in sending to GLEANINGS a photo from a frame of queen-cells which was started on the 18th of September in my yard.



The photo showing this frame of cells was started by the Doolittle method, the bees accepting every cup, there being 17 on the frame. This frame of cells was reared above a queen-excluder, with a good laying queen below. I expect to rear a very large number of queens the coming season for market, all of which will be golden Italians. E. L. DICKINSON.

Los Banos, Cal., Nov. 8.

POPCORN CRISPS; HOW TO MAKE.

In February, 1899, you told about popcorn crisps, but did not tell how they are made. My little girl has tried a number of ways, and wants to know how to make them. Please tell, as it will consume lots of honey all over.

Mayfield, N. Y.

G. W. HAINES.

[The recipe for making popcorn crisps as described in GLEANINGS for February, 1899, is, I suppose, a secret, and the confectioner who makes them, if I understood Mr. Selser, would on no account give away the method of making. It is possible he might do so now. If Mr. S. sees this, will he see what can be done? For a fine toothsome confectionery, popcorn crisps, such as I tasted at Philadelphia, there is nothing any nicer; and, what is more, children could eat them and not get an excess of sweets, as they might from ordinary candy.—ED.]

VENTILATING BEE-CELLARS; DR. MILLER'S METHOD CRITICISED.

I saw in *Stray Straws*, Jan. 15, that Dr. Miller gets foul air in his bee-cellar, and you say in your footnote that this is a clear case, and, the fact being established in the case, it will be reasonable to assume that in other cases foul air is equally the disturbing cause.

I should think the doctor ought to know how to keep foul air out of his cellar without building a fire in it. I have wintered about 75 colonies in the cellar under our house the last 15 years. It is 26 feet square, with a partition through it made of heavy carpet paper. This is put there so that I may darken one half for my bees, and the other half I may have light for storing vegetables, etc., in. There are three windows in the cellar, and two doors—one

door from the dining-room and the other from my back porch.

The chimney from the main part of the house is built from my bee-cellar, floor up.

At the base of this chimney I have a hole for cleaning soot, etc., out, and about four feet from the base I have another hole for a stove-pipe, so that I might put a stove in the cellar should it be necessary. To keep foul air out

of the cellar I leave the holes, just mentioned, open; and to regulate the temperature of the cellar, should it get too high, I open one, two, or three of the windows; and, on the other hand, should it get cold when the windows are closed I open the door that leads from the cellar to the dining-room, at which place there is a heating-stove. The warm air will then go direct from the dining-room to the cellar and up the chimney. The draft going up the chimney is generally so strong that it would put out a good-sized torch-light when placed near the hole.

I don't think for a minute that there is any foul air in my cellar. Of course, if the doctor keeps the hole in his cellar stopped up he may expect foul air; and should he have a door from the cellar to the dwelling part, he may expect foul air to come up every time the door is opened.

Tell the doctor that making fires to drive away foul air is about as good as a thing of the past, as fans are found much better in this age, and likewise used.

A COPPIN.

Wenona, Ill.

HOOPES SMOKER; SOMETHING THAT WILL GIVE THE FREE USE OF BOTH HANDS WHILE IN USE.

In explanation of the drawings, Figs. 1 and 2 show smoker in operation; also the hand, at the same time grasping the end of a frame by

I was led to the designing of this smoker by the inconvenience of having to use both hands to do the smoking, as with the Clark smoker particularly, and the consequent cessation of smoke, in order to commence operations, when the bees would be as bad as ever—in the way, and bunching up, just where not wanted. Then I had to try the smoker again, and it would be several minutes before anything could be done. Another idea is, that the new design favors bringing the smoke to bear just where the hand or fingers are operating, as in lifting out frames, cutting out or inserting queen cells, and for other purposes; and I might say that it will be found convenient for almost all operations of the apiary.

Fig. 6 is a view of roll of cotton of compact shape suitable for a necessarily small smoker as this must be.

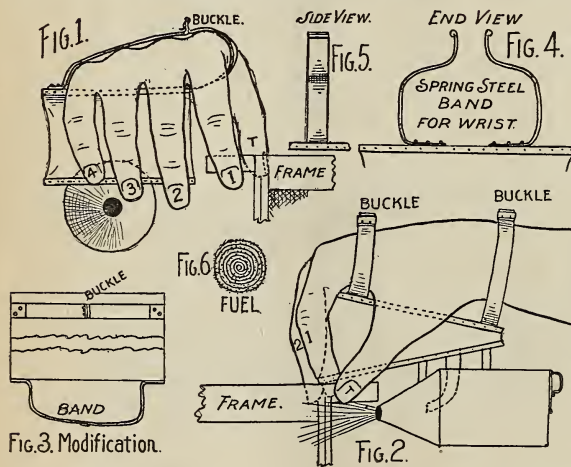
F. T. HOOPES.

East Downingtown, Pa.

[I have often thought I should like to have a smoker so constructed that I could send a continuous stream of smoke, and yet have the free use of both hands. The above arrangement, in my mind, does not quite fill the bill, and yet perhaps it is as good as any thing that could be devised.]

The ordinary smokers with the bellows reversed can be set down on the ground so that the nozzle is within an inch or so of the frames of the hive. If any of the bees get to be obstreperous, the smoker can be picked up and be made to send a stream of smoke down upon the bees instantaneously.

Perhaps if I were to try friend Hoopes' arrangement I might like it; but it seems to me it would considerably handicap the hand to which it was attached.—ED.]



HOW TO FEED COLONIES IN THE CELLAR.

One of my colonies will be short of stores soon. Please tell me how to help them. They are in the cellar. I took them out yesterday, and they had a fine flight. W. E. GRAHAM. Norfolk, Neb., Jan. 23.

[If you have combs of sealed stores, we would advise you to give one or more of these to the bees that are short. If you haven't any of these, give them cakes of hard candy, which can be laid on top of the frames.—ED.]

ADULTERATORS OF HONEY; HOW THEY DEAL WITH THEM IN MASSACHUSETTS.

the finger and thumb; and as for the inconvenience of getting the hand and wrist in or out of the bands which fasten it to the smoker, I have shown the latter drawn up above the hand, and buckled so the bands can be loosened or drawn tight at will.

Fig. 3 shows the band in a different situation on dotted line in Fig. 1, a little modification which I am inclined to prefer to the other way. Figs. 4 and 5 show a spring steel band particularly intended for the wrist. The wrist may be extricated by twisting it on one side, and when withdrawn the spring steel gives way. This is better used in connection with Fig. 3 modification.

You will find a squib clipped from the Boston Traveller, as to how the Massachusetts authorities deal with those who sell impure honey. I think this would be a good article for GLEANINGS, as it might serve as a warning to others who are in a similar position; and as judges are influenced greatly by decisions previously rendered by other courts for similar offenses, it can be used to advantage

by the A. B. K. A. against the next man they take to court for selling adulterated honey.

F. MANSFIELD.

Dorchester, Mass., Jan. 14.

SOLD IMPURE HONEY; SANDS FINED \$25.

Elijah M. Sands, clerk for Haskell, Adams & Co., wholesale grocers of 84 Commerce Street, Boston, was in the Somerville court to-day, charged with selling honey below the standard. The complainant was Inspector McCaffery, of the State Board of Health.

Inspector McCaffery said that he went to the grocery of Z. H. Gilgoff, on Washington Street, Somerville, and took away a tumbler labeled "white-clover honey." He brought it to Herman Lythgoe, analyst for the State Board of Health, who discovered it was far below the standard. Analyst Lythgoe testified that he had made an analysis of the "honey," and found that it contained 82 per cent of glucose.

Sands denied that he had any intention of selling an inferior article, and that he had no means of knowing when it was of the required standard. Judge Story fined him \$25.

GLUCOSE AS A BEE-FOOD; SELLING GLUCOS-ED HONEY.

We have an apiary here, and have been thinking of feeding glucose. Is it a wholesome food for bees—that is, would bees keep healthy feeding it during the summer months? How would you advise us to feed it? What is the law, if any, on selling this honey? Do you think it pays to feed bees when they are not getting anything outside? In feeding glucose, would you advise feeding it pure, or would you mix in something else?

Ohio, Jan. 23.

INQUIRER.

[Feeding glucose, and selling the same for honey! Why, my dear sir, what are you thinking about? That would be a violation of the laws of the State of Ohio, and would subject you to fine and imprisonment. In the first place, it is not possible to feed glucose to bees, even if you can get them to take it. It would have to be considerably diluted in water, and then they might store it in the combs; for the pure stuff, as it comes from the factory, the bees will not touch. If you know when you are well off, you will let glucose entirely alone. Several parties of late have been arrested for selling glucosed honey in Ohio and elsewhere—see above. Glucose as a food for bees is pretty poor stuff. They will almost starve on it, even if diluted with water, as its real sweetening power is very low.—ED.]

HOW TO GET RID OF LARGE RED ANTS.

Can you give a remedy to protect the bee from these large red ants? These are at least $\frac{1}{2}$ inch long. While the bees kill a great many, it seems to get away with a large number of bees. They cut the wings so as to disable the bee, and possibly sting the bee as well. I have insulated them by means of 4 small dishes of water, one at each corner of the hive for the present. This seems to be a new trouble, much worse than the millers, as the latter can be wiped out for the present, but the ant holds on better.

JAY S. BROWN.

Starke, Fla., Jan. 12.

[I am not able to give advice for the South on a matter of this kind; but if possible I would find the nest. With a crowbar I would make a hole an inch or so in diameter down

through the center of the nest. Into this pour eight or ten ounces of bisulphide of carbon, which can be bought at any drug-store. Shut the hole tight with a plug of earth, and that will be the end of *that* nest of ants; for the gas generated by the liquid will permeate all the galleries in it, destroying every living organism therein. As a temporary expedient, setting hives on legs, and the legs in pans of water, is about as good as any thing that can be done. Putting a little carbolic acid in the water will make it much more offensive to the ants. Sometimes painting the legs of the hive, if legs it has, with common tar, will keep the ants off. But the best thing to be done in any case is to find the nest of the ants, if possible, and treat them by the plan described.—ED.]

CANDIED COMB HONEY; WHAT TO DO WITH IT.

To what good use can candied comb honey be put? Why does mine seem to candy so easily? Some of it candies before it is a month old. Perhaps it was not properly ripened.

W. E. HEAD.

Paris Station, N. Y., Dec. 15.

[I would put all such in the solar wax-extractor next summer. The wax can be rendered into nice clean cakes, and the honey fed to bees for stimulative purposes, or sold to bakers as a second-grade honey. Where wax and honey are melted together, the latter is apt to be off in color and flavor.—ED.]

AIKIN'S LAW OF COMB-BUILDING.

If the argument of R. C. Aikin in favor of the tall section, that "In comb-building the downward progress exceeds the sidewise in the proportion of about 3 to 2" (which seems to be the natural way), why would not a brood-frame of the same proportion, say 12 by 8, or 15 by 10, be better?

J. ULRICH GIBBS.

Whittier, N. C., Jan. 20.

[The same law holds true whether the comb is built in a section or brood-frame; and that has been one of the objections to the Langstroth frame, and why some prefer a deep or square frame. But the mere matter of comb-building in brood-frames is of small consequence as compared with that in a section honey-box, because the former may last anywhere from 10 to 25 years, while the other is used only once.—ED.]

SECTIONS $4\frac{1}{4} \times 5 \times 1\frac{1}{8}$ VS. $4 \times 5 \times 1\frac{1}{8}$.

Why not adopt $4\frac{1}{4} \times 5 \times 1\frac{1}{8}$ sections for standard? Tests prove that 4×5 are better filled than $4\frac{1}{4} \times 4\frac{1}{4}$, and more of them; but they average only about 14 oz. I will try 1000 $4\frac{1}{4} \times 5 \times 1\frac{1}{8}$ this year.

Hale, Mo., Jan. 20. GEO. W. SHRADER.

[When well filled these will hold almost an even pound; but as a rule they will run a little short. The $4\frac{1}{4} \times 5 \times 1\frac{1}{8}$ would possibly run a little over a pound if well filled. The $4 \times 5 \times 1\frac{1}{8}$ holds 27.5 cubic inches, and the $4\frac{1}{4} \times 5 \times 1\frac{1}{8}$ holds 29.22 cubic inches.—ED.]



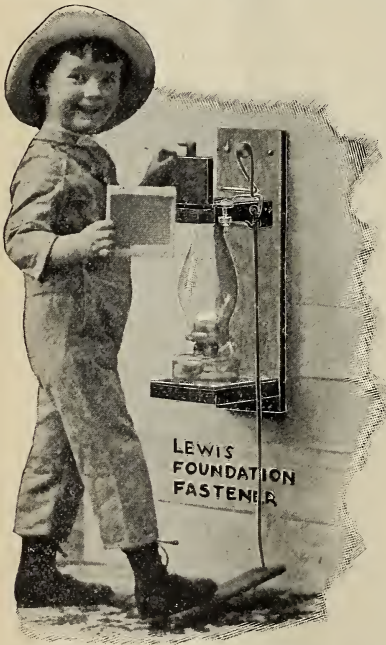
SIXTEEN EXTRA PAGES THIS ISSUE.

THIS was rendered necessary by the accumulation of good matter, and especially to make room for what we consider very opportune and valuable matter for bee-keepers, the report of Dr. Howard, on black brood.

I SECURED quite a fine lot of kodak pictures on my Colorado trip. These will be strung along in these columns for the next three or four months. The bee-keepers of Colorado are very progressive; indeed they have to be, for many of them are specialists. And that reminds me that there are probably more specialists—that is, those who make honey-production almost their sole means of livelihood there—in any other State unless it is California.

THE LEWIS FOUNDATION-FASTENER.

SEEING the illustration above in one of the Lewis Co.'s advertising pages, we felt interested in trying the machine to determine whether we should experience the same satisfaction as does the boy, who seems to be well pleased. We sent for a machine, tested it, and found it



to be all right. It is quick and easy of operation, and is all it is represented to be. Each machine is made so that it can take either $4\frac{1}{4}$ " or the tall section by reversing the plate or heated tongue, which is reversible. This is no paid puff, for our editorial space can not be bought at any price.

THE REFORMED SPELLING.

I SAID in our last issue that I would say no more about the reformed spelling; but so many votes are coming in, both for and against (mostly against), that I feel that some formal acknowledgment is necessary. I therefore desire to thank all of our subscribers who have so far indicated their preference, because it is impossible to acknowledge each one by letter. Even at the present time negative votes are showering in, so the matter will probably have to be shelved for at least a considerable time to come.

A NEW ENEMY.

BEE-KEEPERS have a new enemy to fight in what Dr. Howard has christened *black brood*. A new enemy? Well, perhaps it would be more accurate to say an *old* enemy, but not hitherto recognized. We positively know now that it has been found not only in New York, but in California, and the probabilities are that it has been masquerading under the name of foul brood, pickled brood, and diseased brood in various other States. It is now possible to explain the divergence in opinion in regard to foul brood, or what was thought to be such.

THE NATIONAL BEE KEEPERS' UNION AMALGAMATED WITH THE UNITED STATES BEE-KEEPERS' ASSOCIATION.

It will be remembered that this matter was laid before the members of both associations; and now the vote having been taken by both, the results show that amalgamation has been agreed to almost unanimously. The financial statement of the retiring Union is as follows:

FEBRUARY 1, 1900.

By balance Jan. 1, 1900.....	\$125 95
By 63 members' fees.....	63 00
	\$188 95
To paid for printing, stamps, type-writing, and incidental expenses to date.....	15 00

Balance sent to new treasurer.....\$173 95

The amount of \$173 95 has been sent to General Manager Secor, of what is now the National Bee-keepers' Association.

After fifteen years of continual service, during which time the Union has met with an almost unbroken line of successes, Mr. Newman thanks his many friends for their cordial support, and for their condolence in his present affliction of the loss of sight. He offers congratulations to all the members, and bequeaths from the old Union to the new amalgamated association "a banner unsullied, with victory inscribed upon it;" and he hopes that it may "wave in triumph over the new association for generations to come."

In a private letter Mr. Newman says that, although his health has improved somewhat, he is still unable to read, but hopes for a return of sight after taking further rest.

On behalf of its readers, GLEANINGS extends its cordial sympathy to the veteran who has done such successful service in the way of defense of bee-keepers, and the establishment of valuable precedents in law. The latter have been and can be used again most effectively against unjust legislation.

Hereafter the new organization will be known as the National Bee-keepers' Association—a two-in-one strong organization with a membership of toward 500, and between \$500 and \$700 in its treasury. It has already begun in the matter of prosecuting adulterators of honey, and will very likely in the near future have some startling developments to make, of work done. The organization is growing to be mighty, and its influence has been and will be a power for good; but it can not fight adulterators successfully unless it has a larger amount in the treasury. Send one dollar, and so help along the good work.

CAMERAS FOR TAKING HALF-TONES.

The editor of the *Bee-keepers' Review*, in his January issue, in speaking about cameras for taking pictures, says:

Pictures taken by the ordinary kodak, so called, are of but little value for use in taking half-tones. The greatest trouble is, there is no way for getting a sharp focus. The lens is the kind that is called a universal focus, which means that, whether the object be near or far away the picture thrown on the plate or film will be *passably* sharp, but that is all. To do really fine work, you need a camera that has an adjustable focus, so you can throw a focusing-cloth over your head, and, by observing the image thrown on the ground glass, adjust the focus so that the particular object that you wish to show is brought out with great sharpness and distinctness.

Bro. Hutchinson seems to have gotten a wrong impression of a kodak. Only a few of the cameras bearing that name are of the fixed-focus type; but their pictures are very sharp—much better than “*passably sharp*.” But those of the adjustable-focus type of the *same grade*, and with the same stop, give no better results. There are high-grade kodaks of both kinds, and either gives the same sharpness of detail. Why, the smallest pocket size of fixed focus with a picture $1\frac{1}{2} \times 2$ will make a picture so sharp that it can be enlarged to 10×12 inches. The sharpness of detail is dependent, not on the fixed or adjustable focus, but upon the *price paid*. All instrument's bearing the name “Kodak” are of the highest grade.

There is this trouble with an adjustable focus: A person does not always get it set right. If the focus is universal, he is apt to get the very best the camera can give. But there is not a camera sold by the Eastman Co. but has “stops” by which the focus can be sharpened; and when *time* views are taken, some very clear effects can be secured by the kodak, with the advantage that *every thing* is in focus. I have one of the best Eastman kodaks that can be bought. It has an adjustable focus for objects nearer than 50 feet; and the lens, of the iris-diaphragm principle, is so constructed that it can be stopped down from $\frac{1}{2}$ inch to $\frac{1}{16}$, or what is called 128. It has ground glass and plate attachment as well as a daylight reloading-film device. Taking it all in all, it has the advantages of adjustable-focus instruments with dry-plate ground-glass attachments, and of the hand camera for taking snap shots of the highest order. The lens is so high grade that, even with a wide opening, and a snap-shot at that, I can get a good sharp picture; but let me say that some of the very best ones I took were instantaneous. When

one attempts to take *time* views he is very liable to overtime or undertime; but if he follows the rule laid down for snap-shots and sunshine, he will secure fine effects almost every time.

BLACK BROOD IN CALIFORNIA.

I HAVE been suspecting for some time back that a sort of diseased brood, not foul brood, was working its way into different parts of the country; and when Dr. Howard, of Fort Worth, Texas, and the bacteriologist of the Division of Entomology, Washington, D. C., after a careful investigation, said the samples of diseased brood from the State of New York were not foul brood, but something else, then I began to suspect more than ever that the many samples sent us of brood, not *Bacillus alvei*, from *other States*, were this “something else.”

Very recently a sample of brood was sent us from California. As it seemed to look very much like black brood, and was so very different in its general characteristics from ordinary foul brood, I sent it to Dr. Howard, asking him to examine it microscopically to determine whether or not it was the new disease; and if so, to send me a short report which I could append to the more extended one that appears elsewhere; but as it arrived too late, I give it prominence in this department. Dr. Howard says:

The sample of diseased brood from Nicholas Spargo, Bishop, Inyo Co., Cal., has been received. The general appearance, the peculiar smell, the presence of the black pupae, the dark and black *jelly-like* masses in this disease, in contradistinction to the dark coffee-colored *glue-like* masses of foul brood, are all material symptoms of black brood. The microscopical examination of the contents of a score or more of these cells shows the beautiful millet-seed forms, and the distinct typical arrangement of *Bacillus militi*, found in all the specimens heretofore examined, with no other germs present, which makes it all the more certain that this germ is the cause of this disease.

This explains the mystery; for I have had samples of this brood sent from all over the country, but did not know what they were; and I now feel more than confident that they were nothing more nor less than specimens of black brood.

All of this goes to show the very great importance of this present investigation on the part of Dr. Howard and of the officials of the United States government, and also of the importance of knowing more about it, and the specific method of cure that will handle this disease.

THE COLORADO STATE BEE-KEEPERS' CONVENTION.

THIS association, at its annual meeting, has, occasionally, addresses from professors at the State Experiment Station at Fort Collins. At this convention we had the pleasure of hearing C. P. Gillette, Professor of Entomology, and Dr. Headden, Professor of Chemistry. The latter gave us one of the best talks on the subject of honey, from the standpoint of a chemist, that I ever heard. Instead of using technical and scientific terms, he explained the whole in language that would be intelligible to bee-keepers and farmers, and those with-

out special scientific training. I have secured from Prof. Headden a brief digest of this talk, and take pleasure in presenting it here:

Whatever sugars may be present in the nectar of flowers matters not in answering the question as to what sugars may be present in honey; for it has been proven by direct experiment that the bee, in imbibing and disgorging the sugar, will invert as good as all of it, even though it be a pure cane-sugar syrup which is fed. Honey is essentially the solution of invert sugar composed of approximately equal parts of dextrose, levulose, and water. The name applied to such a mixture of sugar when it has been derived by action of a hydrolytic agent upon cane sugar is "invert" sugar, and when occurring as a natural sugar it is called fruit sugar. Usually there is but little cane sugar present in honey, especially in that deposited by the ordinary honey-bee.

Honey candies upon standing, because of the ability of the dextrose to assume a crystalline form much more readily than the levulose; therefore, if the candied honey be subjected to sufficient pressure the



DR. W. P. HEADDEN.

greater portion of the levulose can be obtained, containing only a comparatively small portion of dextrose; or a more convenient method is to place a portion of the candied honey on a sieve floated on a weak alcohol containing about twenty per cent of water, whereupon the levulose will readily pass into solution in the alcohol, leaving a mass of crystals upon the sieve, which are crystals of dextrose.

If we take some of these crystals, dissolve them in water, and examine the solution by the aid of an instrument called a polariscope, we shall find that it turns the plane of polarization to the right. If we take the alcoholic solution and examine it by the aid of the same instrument, observing proper precautions, we shall find that this solution turns the plane strongly to the left. This is the reason that we have designated the sugars as right-handed sugar and left-handed sugar.

While the left-handed sugar, or levulose, can be obtained crystallized, it is with much more difficulty than in the case of the dextrose. If into a solution of dextrose there be introduced some crystals of this sugar the crystallization can be facilitated very materially; and in our climate, where evaporation takes place rapidly, it is possible that we can bring about the candying of extracted honey by adding to it a small portion of already candied honey or crystalline dextrose.

Prof. Headden performed a series of experiments just as he would before a class of students. He had his polariscope, the use of which he explained and illustrated. He also exhibited some specimens of dextrose that had been secured by chemical means from honey. He next showed a vial of the levulose. The former looked like a very nice grade of light-colored brown sugar. The latter appeared like a very cheap grade of dark-colored molasses.

We next listened to an address by Prof. Gillette. Instead of going into details, explaining foul brood and how to cure it, he explained the nature of all contagious diseases. Any one who has any thing to do with foul brood, diseased brood, or any form of contagious disease, will do well to read this carefully. It will prove interesting as well as instructive; for it is made so plain that any bee-keeper will be able to understand it fully. This paper, taken in connection with what appears elsewhere on the subject of black brood, will help to make the latter very much more easily understood.

Foul brood has long been known as a true contagious disease. Such diseases do their most destructive work when they attack individuals that are crowded together in densely populated communities. The fact that the honey-bee lives in such communities, and the further fact that both the bees and their products are shipped freely from place to place, have made this a very serious and widespread malady. If it once enters an apiary, and nothing is done to eradicate it, it is almost certain that it will, in time, destroy every colony in its immediate neighborhood. Colorado's pure air and abundant sunshine seems to offer no impediment to the rapid development and spread of this disease, which is widely disseminated in the State. It is important, therefore, that all who keep bees should know the cause of this disease, its symptoms, its methods of dissemination, and also the preventives and remedies that may be used to lessen its destructive work. I presume most of you are better acquainted with the symptoms and remedies of foul brood than with its real cause and methods of dissemination, so I have chosen to dwell principally upon these latter topics.

The researches of the past thirty-five years, and chiefly of the past fifteen years, have shown that most, if not all, contagious diseases are the result of the attack of microscopic parasites upon some part of the diseased plant or animal.

Every one understands how it is that parasites such as ticks, lice, and mites that produce itch, scab, and mange, are conveyed from one host to another, and also how it is that the particular complaint accompanying each of these parasites could not occur in the absence of the particular parasite. Cholera, small-pox, diphtheria, and typhoid fever are also parasitic infections, but the organisms producing these diseases are so small that they can not be seen by the unaided eye.

On account of the minuteness of these organisms, requiring the aid of a compound microscope to enable man to see them, there are many people who think that the "bacilli" and "microbes" of which the scientist speaks exist only in his own fertile imagination.

What are these minute organisms? How do they increase in numbers? What do they look like under the microscope? and how do we know that they are the cause of contagious diseases? These are questions that I shall attempt in some degree to answer.

In the first place, it is conceded that these organisms belong to the vegetable kingdom in spite of the fact that they are able to move freely about in the moist media that they inhabit. They are closely related to such vegetable growths as rusts, smuts, mildews, and molds, with which all are more or less familiar.

Although micro-organisms are the cause of nearly all contagious diseases of plants and animals, these organisms are not all detrimental to man's welfare. Some are of the utmost importance. Without them there would be no decomposition of dead animal or vegetable matter, and the soil would lose its fertility.

There would be no fermentation, no souring of vinegar or milk, no ripening of cream or cheese.

These organisms vary greatly in shape. Some are merely oval bodies, being nearly as broad as long; others are cylindrical, or rod-shaped; of the latter, some are very short and others are long compared with their diameters. Others are variously curved, some taking the form of a spiral. All have the power of movement, and when seen alive under the microscope they are usually moving very rapidly about, often in countless thousands.

The germs of foul brood have been named *Bacillus alvei*. They are very large compared with most bacilli, and are in the shape of short rods of varying lengths. The longer ones have about the proportions of the half of an ordinary leadpencil. Although these germs are very large it would require 5400 of them placed end to end to reach one inch. Of the spores formed from the rods it would require 12,000 to span one inch. Some micro-organisms are so small that it would require more than 50,000 to span one inch when placed end to end. Perhaps it would be more intelligible to say that 1,800,000 of these spores could rest side by side on the head of a common pin. This will, at least, make it evident that there would be no use to look for these organisms with the naked eye or with any of the hand magnifiers. Nothing but a powerful compound microscope can reveal them to the human eye.

In 1850, Davaine, of France, discovered great numbers of minute rod-like organisms in the blood of animals dying of splenic fever, or anthrax. He considered these objects as one of the symptoms accompanying the disease, but did not think of such a thing as their being the cause.

A few years later, Pasteur, also of France, began a series of experiments to determine the cause of fermentation of beer and wine. He succeeded in proving, beyond question, that the real cause was the presence and growth of micro-organisms, and that without these organisms no fermentation could be produced. These announcements of Pasteur in 1863 led Davaine to suspect that the rods that he found in the blood of animals having splenic fever might be the cause of that disease. To test the matter he inoculated healthy animals with blood of diseased animals containing the germs, and found that he could produce the disease with great certainty. So it was about 37 years ago that it was first proven that micro-organisms might be the cause of a contagious disease.

When Davaine's announcement was made there were very few, even among scientists, who would believe it. In consequence of this the experiments were carried through again with the utmost care by Dr. Koch, of Germany, in 1876, and by Pasteur, of France, in 1877. The results were so conclusive in proving that the bacilli were the real cause of the disease that Davaine's theory was generally accepted.

In the mean time, in 1865, Pasteur announced the results of his investigation of a terrible silkworm disease known as *Pebrine*, which threatened to destroy the silk industry of France, showing that this disease was also caused by a specific microbe.

These discoveries struck the key-note to the real cause of all similar diseases, whether in man, the lower animals, or in plants. It is one of the epoch-making discoveries of modern times. I will tell you briefly the process by which it is proven that a special microbe is the cause of a particular disease.

In the first place, it must be determined that the organism does not occur in the tissues of the healthy animal. Secondly, the microbes must always be found in the tissues of the animal having the particular disease in question. Thirdly, the organism must be taken from the tissues of a diseased animal, separated from the other organisms and grown through several generations. Then the organisms from the last culture must be inoculated into the tissues of a healthy animal, and cause the particular disease. Lastly, the tissues of this diseased animal must be found to contain the characteristic germ with which the experiment started. Such proof must certainly be conclusive. It is in this way that Cheshire proved foul brood to be caused by the organism that he named *Bacillus alvei*.

Now let us consider how these organisms can increase so rapidly as they must to cause the death of a large animal in a few days after they attack it, which is not an uncommon thing.

A single spore or rod of *Bacillus alvei* is sufficient to start foul brood in a colony if it is eaten by a larval bee, and a few weeks later the germs will be present in countless millions, and nearly all the brood will be diseased or dead. Cheshire estimated that a single

bee-larva might contain a thousand millions of these germs. An illustration or two may help us to understand the enormity of this number. If each of the thousand million germs could be represented by a block an inch on a side, these blocks would be sufficient to build a wall an inch thick, 10 feet high, and more than 130 miles long. Again, if each of these microbes was a foot long, and they were all placed end to end, they would reach more than seven times around the earth.

The method of increase in these organisms is by division. One of the rods attains a certain length, and then divides into two rods. The two soon attain adult size, and divide, forming four. These four and all succeeding ones grow and divide in like manner, which gives an increase in geometrical ratio. A few minutes figuring will prove to you that, if one of these germs and its progeny divide every four hours, they will amount to a billion in less than five days. So, although the number is enormous, the manner of increase makes it possible to attain such numbers in a little time.

Appreciating to some extent the extreme minuteness of these organisms, and remembering that they are hundreds of times smaller than the smallest mote that we can see floating in a sunbeam, we are prepared to understand how they can float about with great readiness in currents of air. Micro-organisms are always about us, in the food we eat, the water we drink, and the air we breathe, but they are more abundant about cities and thickly populated communities than in more thinly populated places. Water exposed to the air always contains them. Experiments by Miquel, of France, showed that rain water contains 64,000 germs to the quart. Most of these germs are perfectly harmless; but when pathogenic (disease-producing) germs do occur in any place, it is easy to understand how readily they may be carried about upon one's hands or clothing, in milk or water, in letters through the mails, by insects such as flies and mosquitoes, and in similar ways.

There is a difference of opinion as to how the foul-brood germs are introduced into the bees. The popular belief is that they are taken into the alimentary canal along with the honey that the larval bee eats. This being the case, there should be large numbers of the germs in the alimentary canal in the early stages of the disease. Cheshire says that the germ almost never makes its attack in the alimentary canal. He thinks the germs come in contact with the surface of the body, begin to develop there, and then penetrate to the interior.

Foul brood was so named because of the offensive odor which usually accompanies it, and the supposition that it attacks the larval bee only; but Cheshire found that mature bees often succumb to the disease. He also states that queens of badly diseased colonies frequently have the disease, and that the eggs laid by them contain bacilli. Pasteur, in 1865, found that the eggs of the diseased female silkworm moths always contained germs of the silkworm disease, and that worms hatching from these eggs always died prematurely. If queen-bees can become diseased, it seems probable, then, that the eggs they lay would contain germs of the disease which would develop and destroy the future larva.

While there can be little doubt that the foul-brood germs are usually communicated to the young bees in honey given them as food, it may also be carried from colony to colony upon the hands, upon knives used to trim burr-combs, or upon boards or cloths or sections, or other furniture used in the hive of an infested colony. If a diseased colony becomes weak, it may be robbed by other colonies, all of which would probably contract the disease.

The symptoms of foul brood are quite characteristic. The larvæ lose their pearly whiteness, gradually changing to a coffee color, finally turning black, and drying down to a mere scale at the bottom of the cell. The coffee-colored mass that the larva changes to is entirely shapeless, showing none of the structure of the grub; and if a sliver or pin be used to remove it from the cell it will stretch out for some little distance, and then snap back. If the larva is nearly grown before the disease attacks it, it may cap its cell, and then, after it dies, the capping usually sinks, and often has a hole at the center. When mature bees are attacked they weaken and die, but retain their form.

You are familiar with the methods of treating this disease as given in the State law, in bee-journals, and by county inspectors, so I shall not take time to treat this phase of the subject, except to warn all, especially beginners, against any attempts to cure the disease. You will do better to bury or burn the entire colony as soon as found to be diseased.



Well done, good and faithful servant; thou hast been faithful over a few things, I will make thee ruler over many things.—MATT. 25:23.

Some of you may smile to think that I have got down to my old text again; but I run against so many people all the time who need exhortations in the way of grasping hold of the things right before them, studying out the whys and wherefores of the strange events and the teeming life that is going on everywhere, that I feel there is more need of exhortations along this line than in almost any other. Some time ago Ernest placed a little pamphlet on my table, and marked it, "Read this right away, and be sure you read every word of it.—E. R." I accordingly read it all through, although I had read the same thing, at least by extracts, several times before. A few days afterward our good friend Jenkins, of Wetumpka, Ala., sent me the following:

Dear Friend:—It is good to get a letter once more, signed "A. I. Root." It reminds me of old times.

A short time ago I ran across an article in a newspaper, which strongly emphasizes some of the points which you have from time to time brought out. Possibly you have seen it. At any rate, I inclose it, thinking perhaps you have not, and thinking that perhaps you may use it or part of it in your work. I liked the piece so well that I carried it in my pocket for some time, showing it to different ones, until I came near wearing it out before sending it to you.

Wetumpka, Ala., Jan. 24.

J. M. JENKINS.

The inclosure referred to in the above was the same as the pamphlet Ernest recommended, and it is a little work you may have read, entitled "A Message to Garcia." It is very prettily gotten up in quaint old-style type, full of ornaments, and printed on heavy deckled paper; and we are just now told that, up to Jan. 1, 1900, 1,021,000 copies have been sold. If you want one to give away, to hand to the children, or to make use of in some other good way, send 10 cents to The Roycrofters, East Aurora, Erie Co., N. Y. By the way, I have obtained permission of the publisher to copy it here, so here it is:

MESSAGE TO GARCIA.

In all this Cuban business there is one man who stands out on the horizon of my memory like Mars at perihelion.

When war broke out between Spain and the United States, it was very necessary to communicate quickly with the leader of the insurgents. Garcia was somewhere in the mountain fastnesses of Cuba—no one knew where. No mail nor telegraph message could reach him. The President must secure his co-operation, and quickly.

What to do!

Some one said to the President, "There's a fellow by the name of Rowan will find Garcia for you, if anybody can."

Rowan was sent for and given a letter to be delivered to Garcia. How "the fellow by the name of Rowan" took the letter, sealed it up in an oil-skin pouch, strapped it over his heart, in four days landed by night off the coast of Cuba from an open boat, disappeared into the jungle, and in three weeks came out on the other side of the island, having traversed a hostile country on foot, and delivered his letter to Garcia, are things I have no special desire now to tell in detail.

The point I wish to make is this: McKinley gave Rowan a letter to be delivered to Garcia; Rowan took the letter and did not ask, "Where is he at?" By the

Eternal! there is a man whose form should be cast in deathless bronze and the statue placed in every college of the land. It is not book-learning young men need, nor instruction about this and that, but a stiffening of the vertebrae which will cause them to be loyal to a trust, to act promptly, concentrate their energies: do the thing—"Carry a message to Garcia!"

General Garcia is dead now, but there are other Garcias.

No man who has endeavored to carry out an enterprise where many hands were needed, but has been well nigh appalled at times by the imbecility of the average man—the inability or unwillingness to concentrate on a thing and do it.

Ship-shod assistance, foolish inattention, dowdy indifference, and half-hearted work seem the rule; and no man succeeds, unless by hook or crook, or threat, he forces or bribes other men to assist him; or, mayhap, God in his goodness performs a miracle, and sends him an Angel of Light for an assistant. You, reader, put this matter to a test: You are sitting now in your office—six clerks are within call. Summon any one and make this request: "Please look in the encyclopedia and make a brief memorandum for me concerning the life of Correggio."

Will the clerk quietly say, "Yes, sir," and go do the task?

On your life, he will not. He will look at you out of a fishy eye, and ask one or more of the following questions:

"Who was he? Which encyclopedia? Where is the encyclopedia? Was I hired for that? Don't you mean Bismarck? What's the matter with Charlie doing it? Is he dead? Is there any hurry? Shan't I bring you the book and let you look it up yourself? What do you want to know for?"

And I will lay you ten to one that, after you have answered the questions, and explained how to find the information, and why you want it, the clerk will go off and get one of the other clerks to help him try to find Garcia—and then come back and tell you there is no such man. Of course, I may lose my bet; but, according to the law of average, I shall not.

Now, if you are wise you will not bother to explain to your "assistant" that Correggio is indexed under C's, not in the K's, but you will smile sweetly and say, "Never mind," and go look it up yourself.

And this incapacity for independent action, this moral stupidity, this infirmity of the will, this unwillingness to cheerfully catch hold and lift, are the things that put pure Socialism so far into the future. If men will not act for themselves, what will they do when the benefit of their effort is for all? A first-mate with knotted club seems necessary; and the dread of getting "the bounce" Saturday night holds many a worker to his place.

Advertise for a stenographer, and nine out of ten who apply can neither spell nor punctuate—and do not think it necessary to.

Can such a one write a letter to Garcia?

"You see that book-keeper?" said the foreman to me in a large factory.

"Yes, what about him?"

"Well, he's a fine accountant; but if I'd send him up town on an errand he might accomplish the errand all right, and, on the other hand, might stop at four saloons on the way; and when he got to Main Street he would forget what he had been sent for."

Can such a man be entrusted to carry a message to Garcia?

We have recently been hearing much maudlin sympathy expressed for the "down-trodden denizen of the sweat-shop" and the "homeless wanderer searching for honest employment," and with it all often go many hard words for the men in power.

Nothing is said about the employer who grows old before his time in a vain attempt to get frowsty ne'er-do-wells to do intelligent work; and his long, patient striving with "help" that does nothing but loaf when his back is turned. In every store and factory there is a constant weeding out process going on. The employer is constantly sending away "help" that have shown their incapacity to further the interests of the business, and others are being taken on. No matter how good times are, this sorting continues; only if times are hard and work is scarce, the sorting is done finer—but out, and forever out, the incompetent and unworthy go. It is the survival of the fittest. Self-interest prompts every employer to keep the best—those who can carry a message to Garcia.

I know one man of really brilliant parts who has not the ability to manage a business of his own, and yet who is absolutely worthless to any one else, because he carries with him constantly the insane suspicion

that his employer is oppressing, or intending to oppress him. He can not give orders; and he will not receive them. Should a message be sent to Garcia, his answer would probably be, "Take it yourself, and be —!"

To-night this man walks the streets looking for work. No one who knows him dare employ him, for he is a regular fire-brand of discontent. He is impervious to reason, and the only thing that can impress him is the toe of a thick-soled No. 9 boot.

Of course, I know that one so morally deformed is no less to be pitied than a physical cripple; but in our pitying let us drop a tear, too, for the men who are striving to carry on a great enterprise, whose working hours are not limited by the whistle, and whose hair is fast turning white through the struggle to hold in line dowdy indifference, slip-shod imbecility, and the heartless ingratitude which, but for their enterprise, would be both hungry and homeless.

Have I put this matter too strongly? Possibly I have; but when all the world has gone a-slumming I wish to speak a word of sympathy for the man who succeeds—the man who, against great odds, has directed the efforts of others, and, having succeeded, finds there's nothing in it; nothing but bare board and clothes.

I have carried a dinner-pail and worked for day's wages, and I have also been an employer of labor, and I know there is something to be said on both sides. There is no excellence, *per se*, in poverty; rags are no recommendation; and all employers are not rapacious and high-handed, any more than all poor men are virtuous.

My heart goes out to the man who does his work when the "boss" is away, as well as when he is at home. And the man who, when given a letter for Garcia, quietly takes the missive, without asking any idiotic questions, and with no lurking intention of chucking it into the nearest sewer, or of doing aught else but deliver it, never gets "laid off," nor has to go on a strike for higher wages. Civilization is one long anxious search for just such individuals. Any thing such a man asks shall be granted; his kind is so rare that no employer can afford to let him go. He is wanted in every city, town, and village—in every office, shop, store, and factory. The world cries out for such; he is needed, and needed badly—the man who can carry a message to Garcia.

You know, friends, I have been furnishing employment to a great number of people almost all my life, and I have studied ways and means to open up employment to those whom we can not take into our institution. I have written a book on the subject, as you may know. Well, this world is full of wants everywhere. There certainly is not any good reason for saying you have nothing to do, and, I almost said, not even if you are deaf or blind or crippled. We have plenty of instances of such people who have made their mark in the world. I need only suggest the name of Helen Keller. Pardon me for repeating once more some things from my own experience.

Some of you know of my craze for the bees in the earlier years; and I could not tell you, even if I tried, how I enjoyed following the subject up day and night until I was well abreast with what is known in almost all the world in regard to bees. Then as market-gardening was only another branch of rural industries, in my efforts to find something to do for the boys, I studied that, and visited the most successful plants devoted to high-pressure gardening that we have in this part of the world as well as in California, Florida, and in Bermuda. I enjoyed that, too, as I did the bees; and as it gradually unfolded little by little in response to my researches, I was appalled that people should remain idle, go hungry, yes, and *starve to death*, with the possibilities God has placed before us.

I have talked with several of our missionaries about the starving people in China. It is

in consequence of their severe drouths. They have plenty of water every year—in fact, *too much* of it. All these people need to do, in order that they may have plenty and to spare, is to construct reservoirs, and save up the water when there is more than anybody wants, until the time of need. But they do not like the *responsibility* of laying up something for a rainy day, or rather, perhaps, for days and weeks when it does not rain.

Oh! we do not need to go to China to find helpless people. I suppose I shall now hurt somebody's feelings by choosing some illustrations nearer home; but any successful business man will tell you the most good he ever *received* was from somebody who talked *plainly enough* to hurt his feelings. There is one passage in the above Message to Garcia which made me smile, and I guess each member of our firm smiled when he read it, and remembered at the same time some of our experience here in the office. The passage is as follows:

Advertise for a stenographer, and nine out of ten who apply can neither spell nor punctuate—and do not think it necessary to.

Our young people go to school and learn book-keeping. Their parents send them away from home to commercial colleges. Oftentimes the father and mother get up early and work late, and scrimp and save to keep the girl or boy in college. Now the college and schools are all right. The young stenographer does very well, perhaps, when he is taking down something with which he is entirely familiar; but let him get out of his ordinary run, and then what? Why, he has to get a dictionary, and spend a great part of his employer's time in thumbing it. In regard to punctuation, I have at times wondered whether they taught it in *any* of the schools nowadays as they did when I was a boy. Well, the boy or girl with the dictionary, and much prompting, gets over the spelling and punctuation, but the letters do not make sense. The employer says:

"John, did you read this letter over before you brought it to me?"

"Oh, yes! certainly."

"Do you always read your letters before you send them off?"

"Why, yes. I almost always do unless something is in a great hurry."

"Did you read this letter?"

"Yes, sir."

"Well, do you know any such word as that? or is there any sense to that sentence?"

John admits he never knew such a word, and he also agrees that he can not see any sense in the sentence. But he may add:

"That is just what you said, and so I put it down."

Now, I do not mean to say the employer never makes a mistake in dictating. If he is very much crowded it would be nothing unusual; but there are certain mistakes that a man would never make, and a little reflection should show the stenographer that he would not.

During the rush of business in the spring it is sometimes exceedingly important that the stenographer should catch something quick as

his employer rushes through the room. In order to do this he should not only have *one* pencil sharpened, but half a dozen of them, right at hand. He wants his blank book open at the right place, and a date over every day's transactions, so that, if his employer tells him to get off something very brief before the mail has gone, he can do it *in one minute*. Now, I have explained this to our clerks over and over, and some of them have caught on, and are always ready; but there are others, notwithstanding frequent failures in the same line, who will have to hunt for a book; then they will turn the pages before they get to the right place, then open drawers, or feel in all their pockets, or tumble around a lot of loose papers to find a pencil; and these same clerks are, a great part of every day, addressing wrappers (or something of that sort) in order to keep them busy. May be they have no aspirations in the way of getting a raise Saturday night; but it is more likely that it does *not occur to them* that the very best way in the world to get a raise is to show their employers how quickly they can get off a message, and get it *right*.

Again, at this season of the year we always have an abbreviated price list of seeds. This is put into every envelope, to save answering questions. To make sure this was in every envelope I had a lot folded and put into a large number of envelopes. Then I could just say to a customer, "The inclosed leaflet gives you the price of the seed you mention, and the little pamphlet (*also* inclosed) tells you all about the plant, and how to grow it—quantity of seed per acre, etc." Now, with too many of our clerks (mind you, not *all* of them) the *letter* would get to the customer all right, but the *leaflet* containing the prices would not be in the envelope, nor the pamphlet. The excuse given for not using the envelopes with the price list already placed in them was that they did not work well while addressing them in the typewriter. The clerk *forgot* to put the things into the envelope, even after he told the customer he would find one inside.

Some of my Christian friends will say right here, "O Mr. Root! do not be too hard on the clerk. He forgot to put in the things you mention, and we are all liable to forget." To which I reply, "Very true; but when this thing goes on day after day with the same person, what would you do then?"* The trouble is, so many *will not* assume responsi-

bility. If you wish to be of assistance to your employer, step into his shoes long enough to see how many things he has to keep an eye on, then see if you can not take his place, at least to *some* extent, and relieve him of some of the responsibility; and especially make it a study to be sure that no forgetfulness or half-heartedness on your part *adds* to his already many busy cares.*

Oh! it is not the Medina boys and girls who alone are responsible for such work. I once wrote to a large manufacturing establishment, asking the price of a steel shaft that I wanted at once. They replied I would find the very thing I wanted, described and priced on the card inclosed in the letter; but no card was in the letter, nor in the *second* one in reply to my protest, so I sent my order somewhere else. I really preferred their make of shaft.

When I attended a convention in Buffalo I was called as a witness in regard to a suit in which sweet clover was called a noxious weed. A young lady stenographer was to take down my statements. A smart young lawyer suggested to her, by way of caution, that I would probably use technical terms she was not familiar with, and requested her to be very careful to get it down correctly. He also requested me to speak very plainly when using such technical terms, and spell the words for her when she required it. She took it down very rapidly, and seemed to be quite an expert; but when I came to read my report as she rendered it I actually could not, for the life of me, get at what I had been trying to tell her. Frank Benton, who was on the same case, told me that was exactly his experience. He had to cross out a great part of what she had written, and write himself what he wanted to say, as nearly as he could remember.

Now, there is another point right here. Sometimes "silence is golden;" but I know of quite a few boys and girls who would get much better pay if they would talk to their employer, ask questions about his business, and try to look at things from the point of view he is taking. Why, I always feel *glad* when some of my helpers ask for an explanation so that they may be able to use their brains instead of going to work like a parrot.

Now, I am not going to find fault in this talk, all the time, any way. We have some as bright and smart Medina boys and girls here on our premises as there are in the world. If you were here I think I could make you admit it. Sometimes a stranger comes here and wants work. He says he has spent all his life with wood-working machinery, and thinks he can run any machine we have on

* When a boy about a dozen years old I was very forgetful. A very good and wise teacher gave me a talking-to that, even though it made me cry, did me a lot of good. He would not have been thus severe had he not been deeply anxious that I should get over my infirmity, and become a good and useful man. What made me cry was because he said the reason I forgot was because I did not *care* enough about the matter; and, my friend, let me say to you in the same way, the reason why you forget, day after day, that which your employer has verily plainly asked you to be sure to remember, is because you do not *care* enough about your employer, your work, your place, or your future advancement. The Bible says, "Blessed are they who hunger and thirst after righteousness;" and righteousness means doing right. When you really *hunger and thirst* after advancement or, if you choose, *right* doing, your reward will come.

* Some one may say right here, "Oh! it is very well for *you* to find fault with clerks; *you* are the boss, and they are the unknown, perhaps uncared for, hired help." To which I reply, that these criticisms are for their own good, and not for my own particularly. I am anxious—yes, I am glad—to see them advance, and in their turn take charge of other helpless people. Some who commenced with us as typewriters have progressed, and have now large establishments of their own; and may be they thought I scolded a good deal away back years ago; but I should not be surprised if one or more of you who read this will say now you owe me a vote of thanks because I *did* urge you to be more careful and more accurate.

our premises. He thinks he is worth \$3.00 or \$3.50 a day; but when we put him in beside some of our expert boys, or a Medina boy of eighteen or twenty, who has been with us, say half a dozen years, the boy will beat him all to pieces at any thing he may touch. The old mechanic, you see, is of the class that goes about here and there, and can not find a steady job. The boy is one of the stripe who would find even *Garcia* if his employer set him at it, and he would use his brain as well as his muscles.

We have some young men with us of whom I should like to tell you something if I could do it without mentioning their names or letting anybody know who it is I have in mind. I say this because they might run on him or become jealous of him if I should tell just how diligently he (or *she*) has been using his hands and intellect. In such an establishment as this there is no end of things that need looking after and repairing. There are steam-pipes, water-pipes, and air-pipes that are liable to leak. The air-pipes are connected with the automatic sprinklers. A great many of these things, no one knows how to do except the foreman of the machine-shop; and unless it is something very serious and complicated, we dislike to take him from his post where he has charge of very important work and of a good many helpers. Well, we have tried again and again to find somebody who would hunt up a leak and repair it, and do it without objecting, and asking why John would not do just as well, or something of that sort. Well, there is one whom I have in mind who is a very good-natured fellow. I think I have known him since he was five or six years old; and although he has been most of his life in our employ, I never saw him look sullen, and I do not think he ever objected to any thing I ever wished him to do. If a sewer was stopped up, and a man was needed to crawl head first down into the sewer, he would do it and look good-natured all the while. Well, some time ago he began to develop an unusual trait. He never gave up to any sort of job. If the construction of some underground or out-of-sight work was something he did not understand he would ask questions about it until he knew all anybody could tell; and if it was necessary to take something apart that was complicated, and something with which he was entirely unfamiliar, he would say, "Now, Mr. Root, I do not think you need to bother anybody about this—that is, if you can afford to give me a little time. I think I can work it out and get it all right." Where another man would declare some expensive digging would *have* to be done, this fellow would say, "No, I would not go to that expense—not just yet, anyhow. We will try to get along without it," and he gets along without it every time. He never says, as some do, "Oh, yes! I can do that all right—no trouble at all;" but he always prefaces his remarks this way: "I *think* I can do exactly what you want, but it may take a little time; and if you decide to let me try it, I will do the best I can." Sometimes he asks for certain helpers who have the right sort of

spirit, and who he knows, by past experience, will work in harmony with him.

Every little while I am surprised to find he is pretty well posted in regard to some branches of mechanics that I supposed he knew nothing about; and then I learn he employs his leisure moments in storing his mind with valuable facts that will likely be useful to him in his work. Again and again I have concluded to let him try his hand at something I had been assured by competent authority could not be done; but so far there has been *no* failure. When I express astonishment that he has secured the result we wanted, and did it in so short a time, I often ask for more particulars, and for the details that enabled him to do the thing that seemed impossible; and then I invariably find some ingenious short cuts that no one but himself would have thought of. Still more, he never miscalculates the strength of materials or tools, and makes no expensive breaks, thus necessitating calling in outside help.

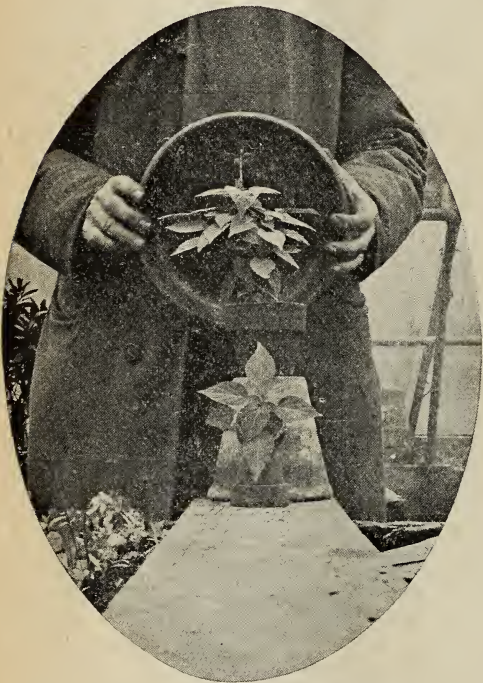
Let me now sum up briefly some of the qualities that are needed in this day and age of ours. First, we want somebody who is pleasant and good-natured. "He that ruleth his own spirit is greater than he that taketh a city." Do not stop to inquire whether you are *hired* to do this, that, or the other. Secondly, we want, or, if you choose, the *world* wants, young people who do not rest day or night until they have the knowledge that belongs to their particular calling at their fingers' ends. If any one who sees this wants a situation as stenographer, do not think of applying for a place until you can spell and punctuate, and read understandingly after you have written it (that is, so far as spelling and punctuation go) every thing you take down. Thirdly, be ready to do any thing or put up with any thing that can not very well be helped, in order to push along the business that lies before you. If you have spare time, study up every thing pertaining to your work. Finally, remember it was the great Master who said, "Thou hast been faithful over a few things, I will make thee ruler over many things."



SOME GLIMPSES OF THE LITTLE GREEN-HOUSE I HAVE BEEN TELLING YOU ABOUT.

You see I wanted Ernest to make a picture of the little *salvia*, and I wanted it taken in such a way as to show the relative size of the pot in which the plant grew and the plant itself. He said I would have to tip it over on its side in order to give a view of the spread of the foliage beyond the edges of the pot. So I placed it as you see in the cut. Now, this little pot it is growing in is an ordinary "thumb pot" just about big enough for a

man's thumb to go inside of it. All the soil it had to grow in was a teaspoonful of jadoo and another of sand packed in close. The plant above it is the parent. When I first received it from John Lewis Childs, one little sprig was broken off in the mails. I had just finished my forcing-bed, and the plant was hastily stuck in some wet sand. Not a leaf withered or faded, and it commenced growing and kept on growing. When it had roots half an inch long it was potted as I have told you, in the little pot, and watered (just before blooming) with jadoo liquid. The plant is now at this date, Feb. 8, in full bloom with quite a cluster of fiery scarlet flowers. In order to produce a background for the golden-hued leaves in the upper plant, I held a stone platter just back of it. In the background you



THE GOLDEN-LEAVED SALVIA THAT GREW SO FAST, AND WHICH IS NOW IN BLOOM IN A THUMB POT.

get a glimpse of one of my favorite azaleas. In the larger picture you get a view of two of the azaleas; and the one near my elbow is at the present time covered with blossoms. Next to it stands a Norfolk Island pine. There is only one spot on the face of the earth where these will grow in the open air. They can not bear the hot sun. Near the post is a rubber-tree. Back of the post is the machinery that raises and lowers the front sash. Next to the edge of the bed where I am sitting is a row of carnations, all different. Between the carnations and the azalea there are 39 different kinds of roses. The Meteor now is budded, and the buds partly open. The geraniums, begonias, and other plants, I need not

name, because you can recognize them in the picture.

Just in front of me is a bed of Grand Rapids lettuce-plants. The next day I sold the whole bedful for \$5.00, and they had occupied the bed scarcely more than 30 days. I had no thought of having my own picture; but after Ernest had taken the salvia he turned his instrument over toward me, and did not even give me time to straighten up my eyeglasses nor to button up my overcoat. Quite a few of the friends have complained sometimes because they did not have a good picture of the writer of the Home Papers. Well, I think you have got it now, just as I look in my every-day attire.

Oh how I should love to take the women-folks, who read GLEANINGS, through all that little greenhouse! and I could tell them quite a little story about almost every plant. When we get to the roses I should like to have Dr. Miller along with the women-folks, because he is an enthusiast on roses. And, by the way, who would ever suppose that a rosebush would grow a foot in only five or six weeks? When my little granddaughter Mildred comes over to see me she almost always wants to see the roots of every plant as well as the tops; and I suppose she would be glad to have me tip the big orange-tree out of its pot to show her the roots as well as the top. The tree had eight oranges on it, but the grandchildren and myself ate four of them, and there are now four left.

Oh! just one thing more. I am so much delighted with the jadoo fiber for growing cuttings, and, in fact, for growing every thing, that I want somebody to share the pleasure with me; and I am therefore getting ready to mail a sample package to every lady who reads GLEANINGS, if she will just send word on a card that she is interested in house-plants, and would like to try some jadoo fiber. We use it one-fourth or one-half sand. Of course, you can get the sand at home. Jadoo can be sent for a small amount of postage, because when dry it is exceedingly light.

When I was out on one of my wheelrides last fall I called on a relative who had just been building a fine house in Tallmadge, Summit Co., O. Not finding the family at home I took the liberty of looking over the new house with its modern comforts and appliances as well as I could from the outside, taking the liberty of looking in the windows. I know this looks a little on the tramp or burglar style; but as I was very well acquainted I made myself quite at home—that is, as well as I could with the doors all locked. Well, on looking in at a newly modeled bay window I caught a glimpse of some plants that made me so happy at the time that I felt the influence of that brief glimpse for a long time afterward; yes, and I feel it yet. The sight that attracted my attention particularly was a group of coleis. I did not know what particular variety at the time, but I found out afterward. It is what is called Sunset. At my next visit my cousin gave me a slip, but I did not know how to handle such things then, and of course it died. Then I

bought some plants, and *they* died. Come to think of it, I believe there is a remnant of one Sunset coleus growing yet, and by the time warm weather comes it *may* pull through. I bought Sunset coleus at different greenhouses, but I did not find any thing quite up to what I saw in that bay window until I got a plant of W. H. Murphey, Minooka, Ill., and one that is all my imagination pictured, and even more too. In fact, I go out to the greenhouse and take a look at it ever so many times a day, and feel happy; but in order to keep its gorgeous coloring I have placed it in the cutting-bed where the air is damp, and the temperature somewhere between 80 and 90 the greater part

buying plants to see if I can get any more to equal it. If I can not, I am going to make cuttings from this one.

Now, there is just one more coleus that is a fit companion to the Sunset. It came from the same place. Right around where the stem adjoins the leaf, there is a delicate pinkish white; but near the center of the leaf is a bright dazzling purple bordering on the most brilliant indigo blue. Then the outer edge of the leaf, which is fringed, is bordered with a vivid green; and the effect is to give the plant an air that reminds one of oriental kings and princes. I see by the catalogs that they have a new coleus called the Empress of India, and



THE AUTHOR OF THE HOME PAPERS AMONG HIS PLANTS IN THE GREENHOUSE.

of the day. The center of the leaves is a brick red, changing to orange and purple. All around the edge of the leaf there is a "silver lining" or rather, perhaps, a "golden" lining, such as you sometimes see far in the west, just as the sun is going down. The edge of the cloud seems to be of burnished gold. Well, this leaf has that look. The leaves near the center, that are just starting out, have all the hues of the most delicate coloring of fruit—say a luscious peach when it is putting on its marvelous tints. Then the leaves are downy enough to give it a glow, when the sun strikes it just right, like the most gorgeous silken plush. I have only this one plant that comes up to my ideal of a Sunset coleus. I am still

I think this plant would fit the name to a dot. It makes one think of the stories in the Arabian Nights; and it also makes me think still *more* of the words, "But I say unto you that Solomon in all his glory was not arrayed like one of these."

I do not just understand why it is I am drinking in day by day so much happiness and enjoyment from the care and culture of these plants; but something seems to say to me that the great Father has a purpose in it all; that he has a mission for me to fill. I often thank God that this new pleasure he has given me does not cost very much money. These two coleus that I prize so highly cost only a few cents each. I begin already to per-

ceive one pleasant feature in this new experience; and that is, that my writings along the line of flowers are getting me acquainted with the *mothers* of our land, perhaps in a way I never got acquainted with them before. I am also getting in touch with some of the fathers as well. In fact, we are just told that the father of our country spent much of his time, and found much enjoyment, in a little greenhouse, and that this greenhouse is still kept in trim out of respect to the memory of George Washington. The paths and beds that he made are still kept much as he left them.

I want to say a little more about that forcing-bed. It is a revelation to me. As it is opened and closed so many times a day, the 3×6 sash is hinged on the back side. A coiled wire spring is attached to the front edge, and then overhead toward the back side, so it holds the greater part of the weight of the sash. It takes but little effort to raise it with one hand, and when up it is caught by a latch that holds it out of the way while I look after and care for the plants. Not only can you make a shoot of almost any thing take root in damp or wet sand placed in this bed, but you can start the most delicate seeds, and make them grow, so far as my experience goes, without a failure. We sowed a paper of Giant Rainbow coleus seed. It was simply sprinkled on the surface of sifted jadoo, and then pressed down with a board. In a very brief time every seed had germinated. About the middle of January we had orders for every Grand Rapids lettuce-plant we had in the house, and more too; in fact, we had to return money, and so it became necessary to get some more lettuce-plants just as soon as possible. Well, we put four rows of lettuce seed in this forcing-bed. In four days they were up, and in four days more they had to be transplanted to a larger bed. It is true, they did not have their second leaves on; but where seed is sown in jadoo, when we take them up every little plant carries a lump of jadoo on its roots; and this enables them to be transplanted with perfect safety. Of course, we should give the seedling plants more room if space were not so valuable. We have at present only one forcing-bed, 3×6 feet inside, so every square inch of room is pretty well occupied with drooping plants or seeds and cuttings.

We have just been transplanting our Rainbow coleus. I believe the usual way is to put them into thumb pots; but we are planting them out with a little spacing-board similar to what we use for cabbage, celery, and tomatoes. We are not going to the trouble of putting them into pots until we select the hand-somest. Some may object to plants that are started under the influence of such a high temperature and such a constant damp atmosphere; but from many experiments I am satisfied it does not make any difference how your plants are started. In fact, the rankest and strongest growth you can get while in the seed-bed is all the better. When they are big enough to move, lower the temperature, give them more air, then transplant them into a bed where the heat and moisture are considerably less than where the seeds grew.

Finally, when you get good roots by the forcing process put them in beds outside, and gradually give them the outside air whenever the weather will admit, and also gradually accustom them to the full blaze of the sun, without protection. If you care enough about them to watch them carefully and study their wants, you can make the very best of plants by the time they are ready to be put out in the open air—that is, if you start them early enough. A plant that has lots of roots, and has got well down into the ground, will stand a tremendous freeze without injury, compared with a plant that is weak and feeble, and has been so, all its life.

Somebody asks me to tell how to harden off rapid-growing tender plants. Well, the above tells it as plainly as I can in print; but you will all have to learn it by practice. Move your shutters off and on as the weather changes; tuck your plants up tight and warm during frosty nights, and then give them all the sun they will stand without injury during bright days. Not all plants can be managed alike. Tomatoes and coleus require a very different temperature and treatment from cabbage and celery plants.

When the sun gets to be too hot in the middle of the day, do not try to remedy the matter by taking off the sash or sliding them back. Let your sash remain down tight over the plants to preserve the damp air inside; but cut off the sun temporarily with a shutter or strip of cloth, or even a newspaper. A cloth or newspaper is better than a shutter, because it lets in some light; but outdoors we are bothered by the newspapers blowing away. Inside of the greenhouse they are just the thing when the sun is too hot on the forcing-bed. Since the above was written I have learned that the dark coleus plant I have described is "Crist Beauty."

GOVERNMENT SEEDS.

We have been assured of late that the seeds sent out gratuitously by the government were to be new and novel varieties, such as people would not usually get of seedsmen. A lot has just been received, addressed to A. I. Root, Medina, O. The packets are labeled as follows: Radish, Chartiers; Beet, Eclipse; Onion, Yellow Globe Danvers, and so on all through. Every variety mentioned has been on the market, and well known, for ten years past at least. In fact, we have cataloged them and sold them for nearly all that time; and yet they send me, a seed dealer, all these things, when I catalog and sell the very same seed in quantities! Whose hard-earned money is it that the government persists in wasting year after year in this manner?

TEMPERANCE AND THE ANTI-SALOON LEAGUE.

Deceitful workers, transforming themselves into the apostles of Christ; and no marvel; for Satan himself is transformed into an angel of light.—II. COR. 11: 14.

As the above league begins to push its way closer and closer into the dens of infamy, the brewers and the liquor-dealers are becoming

more and more desperate. Just one illustration. The brewers of Cincinnati hired a fascinating young woman (of course one without a conscience) to undertake the task of breaking down the morals of the superintendent of our Ohio Anti-saloon League, Rev. P. A. Baker, of Columbus; or if they could not break him down they planned to get him into a compromising predicament. They placed thousands of dollars at the woman's command, and gave her testimonials that any one would consider sufficient. She secured a place among the clerks in the office of the Anti-saloon League as typewriter. By her pleasing address and rare skill and accomplishments as a business woman she deliberately won the good opinion and respect of all the clerks and employees. When she had gone far enough in this line she informed Mr. Baker that several thousand dollars had been left her, and wished him to advise her about putting it out at interest. Of course, he gave her what assistance he could, and the money was soon satisfactorily put out at interest. Mr. Baker soon became suspicious, however, that she was in the employ of the enemy, and let her go on until she showed her colors. Then he obliged her to sign an affidavit admitting that she was hired by the brewers and liquor-men. This affidavit has been published through the papers. The villains, judging by their own depraved hearts, concluded that if they could find a woman with proper accomplishments who would lend herself to their scheme, they would be sure of victory, not dreaming there are *Josephs* in these latter days, in the way of unflinching integrity, as well as in olden times. Since their scheme has come to light, I have been watching for something in the papers to justify or deny the charge against them; but so far I have not seen it.

Just one thing more: Some time ago I got to thinking that, if the whiskey-men would combine with the tobacco-growers and dealers to get out a popular piece of fiction that would have a big run, defending tobacco, beer, and expensive liquors, it might help their hellish traffic and defeat Christians and temperance workers quite a little. Well, they have done this thing already, and it occurs to me that Satan himself stepped forward and made the third one of the trio. What part did he undertake, do you ask? Well, I can imagine him saying, "All right, brethren, go ahead. You get up the book, and I will manage to get the ministers and the ministers' wives and prominent church people to read it and recommend it to their friends. Oh! don't you worry; just give me a chance, and see if I do not do that very thing." And Satan succeeded. The book is called "David Harum." I read the first chapter, and threw it down, declaring I could not waste my time with any book that did not uphold righteousness and temperance. A very good friend of mine, however, and a Christian man of scholarly attainments, urged me to have patience and read the book clear through. I did so, only to find a mock regard for the kind of religion that narrows its scope down to befriending the widows and fatherless, without any Christ about it. I found it a book

that not only casts ridicule on professing Christians, but upholds swindling and swapping horses (even on Sunday), upholds tobacco in all its forms, recommends beer and high-priced liquors, together with tobacco, as sensible and consistent remedies for despondency, and thinks it a fine thing to persuade old ladies, who are members of temperance societies and professing Christians, to learn to drink champagne; yes, and it describes champagne, its taste and effects, so that every school-boy and perhaps many a schoolgirl too would have a curiosity to taste it to see if it is like what the book describes.

Humbugs and Swindles.

Mr. Root:—I am bothered by this swindler every week or so with these circulars. See how cleverly he imitates type-writing. I wish you would show him up.
H. M. JAMESON.

Corona, Cal.

The circular inclosed comes from Marshall, Mich. It is about electric belts. The reason why the great professor sent so many letters is, I take it, that he first offers his wonderful belt for \$20. A few days after, he comes down to \$12; then he sends another letter giving some exceedingly good reasons why he will sell the whole thing for \$5.00 if you take it right off *now*. Now, my good friend J., fishermen do not keep right on casting bait unless they get a bite *once* in a while. This fellow has been getting bites or he would not keep sending out circulars. Perhaps he has not found out yet that the "absent-treatment" professors are beating all the electropoises, electric belts, etc., by performing most astounding cures without *any* medicine or make-believe apparatus or any thing else. They never see their patient, and in some cases we know they do not *even read the letter* the patient writes; but the patient gets well, and the professor gets money hand over hand. We are told there are some people who can not see through a tub after the bottom has dropped out. May be they will after a while—at least we hope so.

MAGNETIC HEALERS, ETC.

Magnetic healers are not Christian people, and one of their number says a "healer" can not be a minister of the gospel. Of course, no minister of the gospel would take money from people after he had succeeded in making them *imagine* they were cured when they *imagined* they were sick. It is the old story over again of superstition, and the kind of superstition that gets hold of the most ignorant heathen to be found on the face of the earth. It is going back to the age of incantation and signs; to olden times when doctors performed all their cures by muttering over strange words, and going through with humbug performances. Shall the present age go back again to witchcraft and heathen darkness? Not while your humble servant is, through God's providence, permitted to live and breathe and protest.

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